

**Institute of Geophysics and Planetary Physics (IGPP)  
Lawrence Livermore National Laboratory (LLNL)**

**Quinquennial Report  
November 14–15, 1996**

**Jan Tweed**

**October 31, 1996**



**This is an informal report intended primarily for internal or limited external distribution. The opinions and conclusions stated are those of the author and may or may not be those of the Laboratory.**

**Work performed under the auspices of the U.S. Department of Energy by the Lawrence Livermore National Laboratory under Contract W-7405-Eng-48.**

# DISCLAIMER

This document was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor the University of California nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or the University of California. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or the University of California, and shall not be used for advertising or product endorsement purposes.

This report has been reproduced  
directly from the best available copy.

Available to DOE and DOE contractors from the  
Office of Scientific and Technical Information  
P.O. Box 62, Oak Ridge, TN 37831  
Prices available from (615) 576-8401, FTS 626-8401

Available to the public from the  
National Technical Information Service  
U.S. Department of Commerce  
5285 Port Royal Rd.,  
Springfield, VA 22161

---

**Institute of Geophysics and Planetary Physics (IGPP)  
Lawrence Livermore National Laboratory (LLNL)**

# **IGPP–LLNL Quinquennial Review**

**November 14–15, 1996**

---



---

# Table of Contents

<b>Introduction</b> .....	1
<b>IGPP–LLNL Overview</b> .....	1
Center for Geosciences .....	2
Astrophysics Research Center .....	3
<b>Mission</b> .....	3
Systemwide .....	3
IGPP–LLNL Branch .....	3
<b>Research Highlights</b> .....	4
Center for Geosciences .....	4
Indo-Asia Collision .....	4
Bolivian-Altiplano Seismic Experiment .....	5
Volcanoes: A Glimpse into the Inner Workings of our Earth .....	5
Experimental Determination of the Geometry of Partial Melting in the Upper Mantle .....	6
Astrophysics Research Center .....	6
Laser Guidestar Project .....	6
The MACHO Project .....	6
FIRST Survey .....	7
Nature and Evolution of Quasars .....	7
<b>University Collaborative Research Program (UCRP) Overview</b> .....	8
UCRP FY 1997 Summary .....	8
<b>Funding Summary</b> .....	11
<b>Current Students and Postdoctoral Fellows</b> .....	12

---

---

## Appendices

Appendix A. Minigrant Recipients .....	A-1
Appendix B. Seminars & Workshops .....	B-1
Appendix C. Bibliography .....	C-1
Appendix D. Organization Chart .....	D-1

## Figures

Figure 1. Distribution of FY 1997 UCRP Awards .....	9
Figure 2. IGPP—LLNL Funding Summary .....	12

## Tables

Table 1. FY 1997 UCRP Projects .....	10
Table 2. 1996 Visiting Students .....	13
Table 3. 1996 Postdoctoral Fellows .....	14

---

# Introduction

This Quinquennial Review Report of the Lawrence Livermore National Laboratory (LLNL) branch of the Institute of Geophysics and Planetary Physics (IGPP) provides an overview of IGPP–LLNL, its mission, and research highlights of current scientific activities. This report also presents the following information:

- University Collaborative Research Program (UCRP) overview (Appendix A lists UCRP project awards for FY 1990–1996)
- UCRP FY 1997 proposal process summary and project selection list
- Funding summary (1993–1996)
- Current (1996) students and postdoctoral fellows
- Seminars presented (Appendix B lists seminars presented in FY 1990–1995)
- Scientific publications (Appendix C lists the bibliography for FY 1990–1995)

## IGPP–LLNL Overview

The Institute of Geophysics and Planetary Physics at LLNL is a branch of the University of California Multi-Campus Research Unit. Established by the Regents of the University of California in 1982, following the recommendations of Orson Anderson and Bruce Tarter, IGPP–LLNL emphasizes research in seismology, geochemistry and cosmochemistry, and astrophysics. IGPP–LLNL provides a venue for studying the fundamental aspects of these fields, thereby complementing LLNL programs that pursue applications of these disciplines in national security and energy research.

Claire Max was appointed as IGPP–LLNL's first Director in 1983. Charles Alcock is IGPP–LLNL's current Director, appointed in 1994. IGPP–LLNL was originally organized into three centers—Geosciences (stressing seismology), High-Pressure Physics (stressing experiments using the two-stage light-gas gun at LLNL), and Astrophysics (stressing theoretical and computational astrophysics). In 1994, the activities of the Center for High-Pressure Physics merged into the Center for Geosciences.

Although the permanent LLNL staff assigned to IGPP is relatively small (presently about five full-time equivalents), IGPP's Research Centers have become vital research organizations. This has been possible because IGPP

- supports a substantial group of resident postdoctoral fellows
- funds approximately 20 UCRP collaborative projects each year
- hosts a variety of visitors, guests, and faculty members (from both UC and other institutions) on sabbatical leave

- 
- hosts conferences and workshops to focus attention on areas of topical interest in the geosciences and astrophysics
  - organizes seminars in astrophysics, earth sciences, and high-pressure sciences

IGPP–LLNL maintains a bibliography of published research papers resulting from UCRP projects and from research by the IGPP’s staff, postdoctoral fellows, and consultants. As a measure of research productivity, the results are gratifying. The abundance of publications from IGPP collaborative projects is a measure of the significance of the results obtained in these projects.

The refereed-journal publication rate for IGPP–LLNL-related projects corresponds to more than one paper per year for each faculty member, two papers per year for each IGPP–LLNL postdoctoral fellow, and two papers per year for each IGPP–LLNL staff member. Appendix C lists the bibliography for FY 1990–1995. (Note that, because of the extensive peer-review process for most scientific journals, several papers submitted by the principal investigators are still in progress. Therefore, we cannot provide an accurate bibliography of 1996 papers published until we receive formal notification from the journals and the authors.)

## **Center for Geosciences**

The purpose of the IGPP–LLNL Center for Geosciences, headed by Frederick Ryerson, is to promote collaborative research in the earth sciences between LLNL and University of California researchers. Many subdisciplines within the geosciences are employed by LLNL’s mission-oriented programs, and IGPP–LLNL draws upon these capabilities and expertise to act as a focal point for research in the more fundamental aspects of these areas. In doing so, we hope to consolidate the many talents and capabilities at LLNL and to provide an easily identifiable avenue for LLNL–UC collaborations.

The Center for Geosciences is the physical and scientific focus for interactions with visitors from academic (UC and other universities), industrial, and government geoscience research institutions. The Center’s past research emphasis has been on the physics and chemistry of the solid Earth, including seismology, geochemistry, experimental petrology, mineral physics, and hydrology. More recently, we have initiated an effort in interdisciplinary studies of active tectonics.

The Center is located in, and partially supported by, the LLNL Geosciences Divisions. It has strong ties with programs in these Divisions, as well as in the Isotope Sciences Division of the Chemistry and Materials Sciences Directorate and the UC/LLNL Center for Accelerator Mass Spectrometry. The IGPP–LLNL Center for Geosciences provides access to computational, experimental, and analytical research facilities, and supports fieldwork for geophysical and geochemical studies.



---

## Astrophysics Research Center

The Astrophysics Research Center at IGPP–LLNL, headed by Charles Alcock, provides a home for theoretical and observational astrophysics. We serve the aims of the IGPP–LLNL in the area of astrophysics, in part by managing the astrophysics portion of the UCRP and by facilitating contacts between UC scientists and their LLNL counterparts.

The Center also serves as the focus of astrophysics activities at LLNL, and provides an interface with the Physics & Space Technology Directorate’s Laboratory for Experimental Astrophysics and with other astrophysics efforts at LLNL. This Center edits an annual Observatory Report that covers all astrophysics activities at LLNL (and is published in the *Bulletin of the American Astronomical Society*).

The staff and postdoctoral researchers of the Astrophysics Research Center carry out a significant program of research. This research has evolved into areas that exploit LLNL capabilities in optics and image processing, such as the Laser Guidestar Project led by Claire Max, the MACHO (MASSive Compact Halo Objects) Project led by Charles Alcock, and the FIRST (Faint Images of the Radio Sky at Twenty centimeters) Survey led by Bob Becker.

## Mission

IGPP–LLNL not only adheres to the mission of the Systemwide Office, but has also established additional mission statements specific to our role within LLNL.

### Systemwide

- To promote basic research involved in understanding the structure, origin, and evolution of the solar system and its planets.

### IGPP–LLNL Branch

- To enhance University-Laboratory relations by fostering collaborations between UC campus faculty, staff, students, and LLNL staff.
  - To provide LLNL programs with input of new ideas, people, and contact with the large university community.
  - To foster top-quality research at LLNL in the more “basic” or “fundamental” aspects of fields that are important to LLNL programs.
  - To provide a stimulating venue for LLNL scientists to broaden their research horizons.
-

---

# Research Highlights

## Center for Geosciences

The Center for Geosciences has developed a research program to study the physics and chemistry of the solid Earth, including seismology, geochemistry, experimental petrology, mineral physics, hydrology, and active tectonics. Some of this research is summarized below.

### Indo-Asia Collision

The collision of India with Eurasia began about 55 million years ago, and has led to the formation of the Himalayas, the Tibetan Plateau, and resulting deformation as far north as Siberia. This continent-continent collision is likely the most profound continental tectonic event in the last billion years of earth history, and understanding the mechanisms that accommodate collisional stresses is one of the major issues in continental geodynamics.

The establishment of the Tibetan Plateau has had significant climatic consequences (the onset/intensification of the monsoon cycle), and has led to the modification of ocean chemistry and the formation of petroleum-producing basins along the Asian margin. One of the major controversies regarding the tectonic history of Asia is the manner in which convergence due to the Indo-Eurasian collision has been partitioned between crustal thickening and continental extrusion. Resolution of this issue requires that the timing, sequence, and magnitude of deformation within and around the Tibetan Plateau be determined over the history of the collision. Along with our colleagues at IGPP-UCLA and IPG-Paris, this goal has been the general focus of our research in Asia.

Our work in Asia has been primarily focused on four areas: (1) the Red River Shear Zone in Yunnan Province, (2) the Gangdese batholith and Indus-Tsangpo suture zone in southern Tibet, (3) the Main Central Thrust in Nepal, and (4) the Altyn Tagh Fault System and associated structures defining the northern boundary of the Tibetan Plateau. In the first three areas, we have used a combination of structural mapping, thermochronometry, and petrology to define Tertiary deformation in these regions. Along the Altyn Tagh system, we are using a combination of geomorphic analysis and cosmic-ray exposure dating to constrain the Quaternary slip history within this strike-slip system and associated contractional features.

The major emphasis of our current research in Asia is an attempt to constrain the active velocity field within the region influenced by the India and Asia using cosmogenic surface dating methods, focusing on the Altyn Tagh Fault System. Considerable effort has been devoted to understanding the Tertiary tectonic evolution of Asia.

However, the manner in which various deformation mechanisms have contributed to the accommodation of Indo-Asian convergence remains controversial. The controversy centers around some simple issues: "How do continents deform?" "Do they respond as a continuum, or as rigid blocks where strain is localized along the boundaries?" That this controversy endures is due in part to poor constraints on the rates of movement along major active fault zones. Until these rates are known, we will not be able to determine whether or not the

---

absolute convergence rate (between India and Siberia ~50 mm/yr) requires internal deformation of the individual crustal blocks.

### **Bolivian-Altiplano Seismic Experiment**

The IGPP-LLNL Center for Geosciences is participating in an ongoing deployment of a passive source, broadband, seismic experiment in the central Andean Cordillera of Bolivia and northern Chile. The Altiplano, in southern Peru, western Bolivia, northern Chile, and the Puna of northwestern Argentina, together forms one of the world's highest and largest plateaus, second only to the Tibetan Plateau. The Altiplano has an average elevation of nearly 4 km, has a crustal thickness of at least 65 km, and covers an area of over 600,000 km<sup>2</sup>. The Altiplano is part of the central Andean mountain belt and is clearly associated with subduction of the Nazca plate beneath the South American plate. However, the origin of the Altiplano remains controversial.

The main scientific objective is to extend our understanding of the deep structure and tectonics of the central Andean Cordillera in South America, and in particular the Altiplano Plateau (the world's highest plateau associated with ocean-continent subduction). The primary questions we seek to answer are: "How did the Altiplano form?" "How does it retain its high elevation?" and "What is the role of the lithosphere in the mountain building process?"

This is an international, multi-institutional experiment with participants from the University of Arizona; the Carnegie Institution of Washington; San Calixto Observatory of La Paz, Bolivia; and the Lawrence Livermore National Laboratory.

### **Volcanoes: A Glimpse into the Inner Workings of our Earth**

Volcanoes are beautiful in tranquillity and awesome in eruption, yet to scientists they represent much more. Volcanoes bring molten rock (lava) and gases from the planet's deep interior to the surface, forming new islands, mountain ranges, and large lava plains, and providing an important glimpse into the dynamic processes that have shaped our Earth. More than 75 percent of the volcanoes that erupt above sea level occur parallel to deep oceanic trenches where cold oceanic material descends into the Earth's interior (mantle). The chain of resulting volcanoes is called an island arc. This tectonic environment (called a subduction zone) marks the principal area for the return of the Earth's crust into the mantle from which it was derived and results in the selective physical and chemical exchange of material between the Earth's crust and mantle.

We know that a number of different sources and processes contribute to island arc magmas, but quantification of these different inputs has been difficult. To gain a better understanding of the chemical recycling in island arc settings, we have begun a detailed trace element, radiogenic, and stable isotope study of the Klyuchevskoy volcano in Kamchatka, Russia. The chemical and isotopic compositions of the mantle, subducting oceanic material, and arc crust can be distinct and, thus, can offer the potential of being used as geochemical tracers to more precisely quantify the recycling process between the Earth's mantle and crust.

---

## **Experimental Determination of the Geometry of Partial Melting in the Upper Mantle**

The Earth is mostly solid, with molten rock or free fluid existing deep in the Earth only at special locations, such as near plate boundaries and hot spots. We know from volcanoes, along with other evidence, that molten rock (magma) is formed at depth in the Earth and is able to migrate to the surface before it solidifies. High concentrations of some trace elements in the magma, along with the water in the magma itself, also indicate that water-rich fluids are able to migrate long distances through solid rock. These fluids alter the composition of minerals and magma that they encounter and promote melting of the solid rock. In this IGPP-LLNL-funded project, we are studying the texture of rocks containing small amounts of fluid and/or melt under the conditions of high pressure and temperature that exist in the Earth. Our aim is to learn about the transport and chemical effects of these melts and fluids.

## **Astrophysics Research Center**

The Astrophysics Research Center has developed a research program that exploits the traditional strengths in astrophysics at LLNL, and in addition opens up new areas not previously represented at the Laboratory. This research ranges from smaller-scale theoretical and observational projects carried out by the staff and postdoctoral fellows to large collaborative ventures that involve scientists from outside IGPP-LLNL. Summaries of some of these projects are presented below.

### **Laser Guidestar Project**

The LLNL Laser Guidestar Project will greatly improve the performance of astronomical telescopes. Turbulence in the atmosphere seriously degrades the quality of astronomical images on ground-based telescopes; this is part of the motivation for launching telescopes into space. Using laser, optics, and system engineering expertise from LLNL's Laser Program, combined with the astrophysical knowledge in IGPP-LLNL, this project is developing novel image correction technology that will allow large telescopes such as the Keck telescope (Hawaii) to achieve their full scientific potential.

### **The MACHO Project**

Elusive "dark matter" makes up 90% of our own galaxy, the Milky Way. The MACHO Project measures the fraction of this dark matter that is made up of "MACHOs" (MASSive Compact Halo Objects), planet-like objects that emit no light, by searching for the gravitational magnification by MACHOs of distant stars. The Macho Telescope System measures the brightnesses of up to 40 million stars per night, using a digital imaging system of unprecedented power, and has recorded over 120 magnification events. These events are followed in detail by six other telescopes in the southern hemisphere. This project is the leader in the scientific search for dark matter.

---

## **FIRST Survey**

Faint Images of the Radio Sky at Twenty centimeters (FIRST) is a project designed to produce the radio equivalent of the Palomar Observatory Sky Survey over 10,000 square degrees of the North Galactic Cap. Using the NRAO Very Large Array (VLA) and an automated mapping pipeline, we produce images with 18 arcsec pixels, a typical rms of 0.15 mJy, and a resolution of 5 arcsec. At the 1 mJy source detection threshold, there are ~90 sources per square degree, ~35 percent of which have resolved structure. To date, our catalogue contains ~250,000 radio sources, and will be used to study quasars, extragalactic radio sources, and cosmology.

## **Nature and Evolution of Quasars**

During the past five years, Willem van Breugel, together with IGPP–LLNL postdocs and UC faculty and graduate students, has made significant progress in our understanding of the origin and evolution of massive galaxies at high redshift. Observations with the refurbished Hubble Space Telescope (HST) and Keck 10m telescope, both of which became available for general use in 1994, resulted in several key discoveries.

Deep HST images of radio galaxies at very high redshifts showed that their morphologies consist of very clumpy structures, some of which is aligned with the associated radio sources, which are embedded in extended halos of diffuse emission. These observations are the first evidence that these galaxies, the probable progenitors of massive elliptical galaxies at the present epoch, form through the merging of star-forming subcomponents, as predicted by dissipative galaxy formation theories.

Subsequently, Keck near-infrared images have shown the first evidence that the forming galaxies seen with HST indeed evolve into elliptical galaxies. There is a clear trend of decreasing morphological complexity with decreasing redshift, and a striking example of a high redshift galaxy was discovered which has the elliptical morphology, surface brightness profile, and luminosity similar to present-day elliptical galaxies.

Keck spectropolarimetry observations of several high redshift radio galaxies have further shown that the radio-aligned optical components are strongly polarized, both in the continuum and broad emission lines. These data are definite proof that these aligned features are due to scattered light from hidden or misdirected, quasar-like active galaxy nuclei—radio galaxies are quasars in the sky-plane or, similarly, quasars are radio galaxies directly pointed toward us.

---

# University Collaborative Research Program (UCRP) Overview

A major responsibility for IGPP–LLNL is to foster scientific collaborations between researchers at the UC campuses and those at LLNL in areas related to earth science, planetary science, and astrophysics. We do this by sponsoring the University Collaborative Research Program (UCRP), which provides funds to UC campus scientists for joint research projects with LLNL. The goals of the UCRP are to

- enrich research opportunities for UC campus scientists by making available to them some of LLNL's unique facilities and expertise
- broaden the scientific program at LLNL through collaborative or interdisciplinary work with UC campus researchers

UCRP funds (provided jointly by the Regents of the University of California and by the Director of LLNL) are awarded annually on the basis of brief proposals, which are reviewed by a committee of scientists from UC campuses, LLNL programs, and external universities and research organizations. Typical annual funding for a collaborative research project ranges from \$5,000 to \$25,000. Funds are used for a variety of purposes, including salary support for visiting graduate students, postdoctoral fellows, and faculty; experimental facility costs; and released-time salary support for LLNL scientists.

From FY 1990–1996, IGPP awarded over \$3.6M to 202 research projects. Appendix A lists these UCRP awards.

## UCRP FY 1997 Summary

IGPP–LLNL distributed a Call for Proposals for the FY 1997 UCRP in January 1996. Proposals were due by April 5, 1996, and an internal review was held at our branch office on May 9–10, 1996.

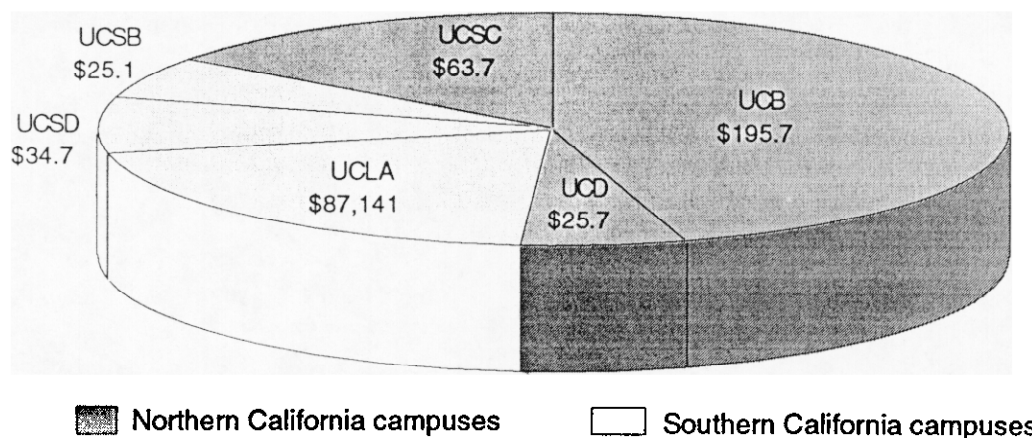
Of the 55 proposals received, 19 were in the Astrophysics and 36 were in the Geosciences. Total requested funding was \$1.3M.

The quality of this year's projects was very high, and "seriousness of collaboration" was our primary tool for separation. We have identified 21 projects (9 in Astrophysics and 12 in the Geosciences) for FY 1997 funding, totaling \$432,000.

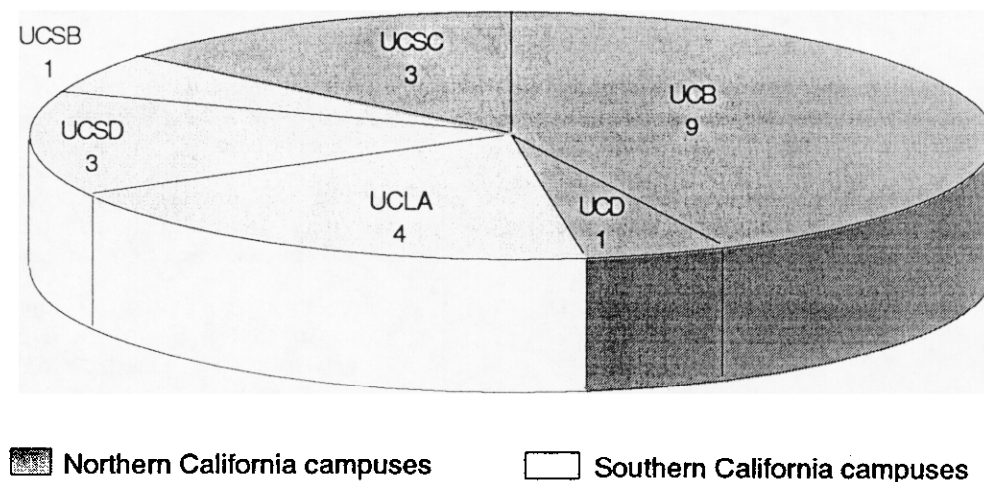
Figure 1 shows the distribution of FY 1997 UCRP awards (colloquially referred to as 'minigrants') among the UC campuses, by (a) total funds awarded and (b) number of projects funded for each campus. Table 1 lists FY 1997 UCRP funding recipients.

*Figure 1. Distribution of FY 1997 UCRP awards to UC campuses from IGPP-LLNL: (a) funds awarded in thousands of dollars, and (b) number of projects funded.*

**(a) Funds awarded (in thousands of \$)**



**(b) Numbers of awards**



**Table 1. FY 1997 UCRP Projects**

<b>Project No.</b>	<b>UC Campus</b>	<b>Principal Investigators</b>		<b>Project Title</b>
		<b>Campus</b>	<b>LLNL</b>	
GS-001	Los Angeles	Yin, An	Ryerson, Frederick J.	Western Termination of the Karakorum Fault in SW Tibet: Implications for Lateral Extrusion Tectonics during the Indo-Asian Collision
GS-002	Los Angeles	Harrison, T. M.	Ryerson, Frederick J.	Pliocene Wedge Extrusion in the Himalaya?
GS-003	Los Angeles	Leshin, Laurie A.	Ryerson, Frederick J.	Oxygen Isotopic Exchange During Dynamic Crystallization: Constraints on Processing of Pre-Solar Components in CAIs
AP-004	Davis	Becker, Robert H.	van Breugel, Willem	A VLA Survey of the Sky at 1400 MHz
AP-005	Santa Barbara	Antonucci, Robert	van Breugel, Willem	Unified Models & Alignment Effect in Radio Galaxies and Quasars
GS-008	San Diego	Dayton, Paul K.	Southon, John R.	Estimation of Age and Growth Rates of the Desert Perennial Ocotillo ( <i>Fouquieria Splendens</i> ) by Accelerator Mass Spectrometry Radiocarbon Measurements
GS-011	Berkeley	Romanowicz, Barbara	Larsen, Shawn	3D Modeling of Regional Broadband Waveforms
GS-013	Santa Cruz	Lay, Thorne	Walter, William R.	Source and Propagation Effects on Regional Seismic Discriminants in the Western U.S.
AP-014	San Diego	Griest, Kim	Alcock, Charles	Microlensing as a Method of Searching for Extra-Solar Planets
GS-016	Santa Cruz	Anderson, Robert S.	Finkel, Robert	Does Cosmogenic Radionuclide Dating of Depositional Surfaces Work? A Test on Surfaces of Known Age.
AP-017	Los Angeles	Cline, David B.	Labov, Simon E.	Supernova Neutrino Burst Observatory, Neutron Monte Carlo Simulation Project at the DOE Waste Isolation Pilot Project Site
AP-018	Berkeley	Graham, James R.	Macintosh, Bruce	Infrared Adaptive Optics Development and Observing to Search for Massive Exoplanets, Brown Dwarfs, and Very Low Mass Stars
GS-021	Berkeley	Ingram, B. Lynn	Southon, John	Radiocarbon Record of Global Climate Change in Santa Barbara Basin
GS-023	Santa Cruz	Schwartz, Susan	McNamara, Daniel	Lithospheric Structure in the Southern San Francisco Bay Area
AP-028	Berkeley	Stark, Philip B.	Berryman, James G.	Helioseismology with Solar Luminosity Constraints



---

**Table 1. FY 1997 UCRP Projects (cont.)**

<b>Project No.</b>	<b>UC Campus</b>	<b><u>Principal Investigators</u></b>		<b>Project Title</b>
		<b>Campus</b>	<b>LLNL</b>	
GS-029	Berkeley	Kirchner, James W.	Finkel, Robert C.	Direct Measurement of Climate Effects on Long-Term Rates of Erosion and Weathering
AP-035	Berkeley	Sadoulet, Bernard	Mears, Carl A.	A New Cryogenic Detector for X-ray Astrophysics and Particle Cosmology
GS-038	San Diego	Marti, Kurt	Hutcheon, Ian D.	Isotopic Heterogeneity of C and N in Graphics of IAB Iron Meteorites: An ION Microprobe Study
AP-043	Berkeley	McKee, Christopher F.	Klein, Richard I.	Numerical Studies of Fragmentation in Star-Forming Regions
GS-054	Berkeley	McEvelly, Thomas V.	Hutchings, Lawrence	Recurrence, Interaction, and Source Processes of Small Characteristic Earthquakes
AP-055	Berkeley	Flynn, Brian C.	Max, Claire E.	Developing Adaptive Optics as a Technique to Search for Asteroid Satellites

---

## Funding Summary

Research within the IGPP-LLNL is supported principally by internal Laboratory funds, but there is a growing amount of support raised from agencies other than DOE. The funding profile of the IGPP-LLNL over the past four fiscal years is shown in the Figure 2.

The principal source of support for the research activities is Laboratory Directed Research and Development (LDRD) funds. LDRD is derived from an internal tax (6%) on most funds coming into the Laboratory. This money is awarded on the basis of an annual, internal competition, and there is no guarantee that any group (such as IGPP-LLNL) will be supported. We have been very competitive in this arena, and have consistently been much more successful than the norm. Additionally, we have been able to consistently expand this source of support. (The apparent drop from FY94 to FY95 reflects the establishment of the University Relations Program at LLNL; many of its activities had previously resided in the IGPP-LLNL.)

The Weapons Research, Development, and Testing (WRD&T) budget is provided to IGPP-LLNL by the Physics & Space Technology Directorate. This support is at the discretion of the Associate Director for Physics (Richard J. Fortner), and may be used for research purposes only.

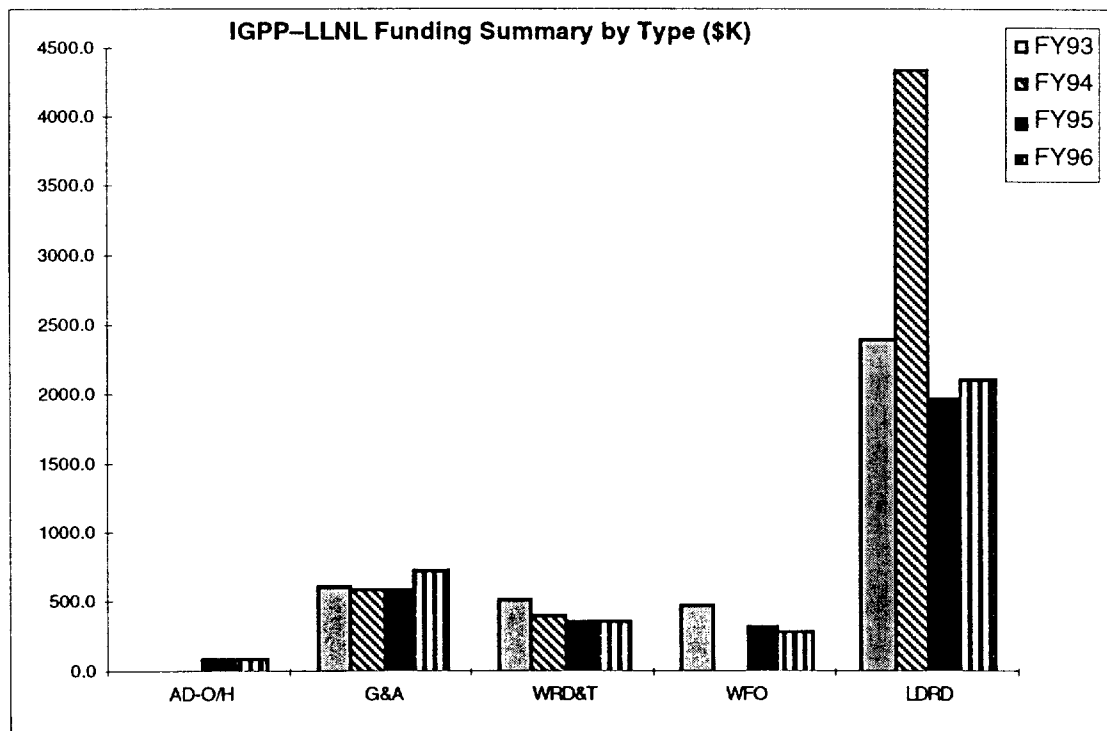
A modest but increasing amount of "Work for Others" (WFO; not derived from DOE) support is coming into the IGPP-LLNL. Most of this comes from NASA and is related to observations with the Hubble Space Telescope. Scientists at LLNL may not propose to the National Science Foundation.

---

---

Administrative functions within the IGPP–LLNL are supported by “G&A” funds (general overhead funds), and to a lesser extent, by the Associate Director for Physics (AD-OH) funds. G&A money is also used to support the University Collaborative Research Program.

*Figure 2. IGPP–LLNL Funding Summary (FY 1993–1996).*



## Current Students and Postdoctoral Fellows

IGPP–LLNL houses and mentors visiting undergraduate and graduate students, and also has a resident staff of postdoctoral fellows, all working in close collaboration with IGPP–LLNL scientists on numerous research projects. Tables 2 and 3 show our 1996 participants.

**Table 2. 1996 Visiting Students**

<b>Name</b>	<b>Campus</b>	<b>Status</b>	<b>Notes</b>
Alves, David	UC Davis	grad student	DOE Associated Western University (AWU) Fellowship
Arviso, Joyce	Navajo Community College	undergrad student	AWU Student Fellowship
Baskett, Lawrence	Stanford University	undergrad student	
Basu, Antara	UC Berkeley	undergrad student	
Bischof, Otto	UC Davis	grad student	
Catlos, Elizabeth	UC Los Angeles	grad student	
Dawson, Steven	UC Irvine	undergrad student	AWU Student Fellowship
de Breuck, Carlos	Leiden University	grad student	
de la Cerda, Anthony	UC Davis	grad student	
Eckart, Megan	UC Berkeley	undergrad student	
Holliman, John	UC Berkeley	grad student	
Hurt, Todd	UC Santa Barbara	grad student	
Kane, Jave	University of Arizona	grad student	
Kent, Adam	California Institute of Technology	grad student	
Lehner, Matthew	UC San Diego	grad student	
Lundstrom, Craig	UC Santa Cruz		
McLaughlin, Gail	UC San Diego	grad student	
Meriaux, Anne-Sophie	Institut de Physique du Globe de Paris	grad student	
Murphy, Michael	UC Los Angeles	grad student	
Neroda, Elizabeth	California Institute of Technology	undergrad student	
Parriott, Joel	University of Michigan	grad student	Computational Science Graduate Fellowship Program (1993)
Pratt, Mark	UC Santa Barbara	grad student	
Price, Trevor	UC Davis	undergrad student	
Rorabeck, Andrew	McMaster University, Canada	grad student	
Stevens, Daniel	UC Berkeley	grad student	
Truelove, J. Kelly	UC Berkeley	grad student	
Umurhan, Matt	Columbia University, New York	grad student	
Vandehei, Thor	UC San Diego	grad student	
Wade, Watasha	Louisiana State University	grad student	

---

**Table 3. 1996 Postdoctoral Fellows**

<b>Name</b>	<b>Field of Study</b>	<b>Name</b>	<b>Field of Study</b>
Brotherton, Michael	Astrophysics	Lehnert, Matthew	Astrophysics
Brenan, James	Geosciences	Macintosh, Bruce	Astrophysics
Cimatti, Andrea	Astrophysics	Marshall, Stuart	Astrophysics
Farber, Daniel	Geosciences	Minarik, William	Geosciences
Fiske, Peter	Geosciences	Minniti, Dante	Astrophysics
Gibbard, Seran	Astrophysics	Moran, Edward	Astrophysics
Gregg, Michael	Astrophysics	Rhie, Sun Hong	Astrophysics
Jedamzik, Karsten	Astrophysics	Stanford, Adam	Astrophysics
Kohn, Matt	Geosciences	Tran, Hein	Astrophysics
Laurent-Muehleisen, Sally	Astrophysics		

---

## **Appendix A**

**IGPP-LLNL Minigrant  
Recipients, 1990-1996**

---



# UC Berkeley

Name	Status	Field*	Grant #	Name	Status	Field*	Grant #
Alivisatos, Paul	faculty	HPS	91-48	Kavner, Abby	student	HPS	93-61, 94-44
Amirbekian, Ruben	student	GS	96-20	Kavner, Abby	student	GS	95-16, 96-18
Arens, Eric	staff	AP	92-48	Kirby, Stephen H.	staff	HPS	91-36, 92-06, 93-52
Arens, John	faculty	AP	90-09	Kirchner, James W.	faculty	GS	96-12
Arons, Jonathan	faculty	AP	90-14, 91-27, 92-23, 93-12	Lange, Andrew	faculty	AP	91-14
Basri, Gibor	faculty	AP	93-13	Liedahl, Duane A.	student	AP	90-31
Bennett, Kristin	student	HPS	91-36, 92-06, 93-52, 94-38	Loper, Susanna	staff	GS	93-46
Bohn, Ted	student	GS	93-46	Matheson, Thomas	student	AP	92-21
Bukowinski, Mark S. T.	faculty	HPS	90-04, 91-46, 93-47	McEvelly, Thomas V.	faculty	GS	96-10
Clymer, Richard	staff	GS	94-07	McKee, Christopher F.	faculty	AP	94-32, 95-06, 96-40
Craig, William	staff	AP	90-29	Meade, Charles	student	HPS	90-36
Daymo, Eric	student	GS	92-29	Meixner, Margaret	student	AP	90-09, 92-48
Dey, Arjun	student	AP	92-20, 93-05	Murray, Richard W.	student	GS	90-41
Dietrich, William E.	faculty	GS	92-10, 93-34, 95-38, 96-05	Nadeau, Robert	student	GS	96-10
Dreger, Doug	staff	GS	96-04	Nishiizumi, Kunihiko	faculty	GS	94-13, 95-38, 96-05
Filippenko, Alexei	faculty	AP	92-21	O'Neill, Bridgette	student	HPS	91-51
Foxal, William	staff	GS	96-10	Raffelt, Georg	student	AP	90-25
Gallant, Yves	student	AP	90-14, 91-27, 92-23, 93-12	Richmond, Michael	student	AP	92-21
Galwala, Sunil	student	AP	96-41	Richter, Matthew	student	AP	93-07
Gee, Lind	staff	GS	93-46	Romanowicz, Barbara A.	faculty	GS	93-46, 94-07, 96-04
Godwal, B. K.	staff	HPS	90-36	Sadoulet, Bernard	faculty	AP	96-41
Graham, James R.	faculty	AP	93-07	Salati, Pierre	student	AP	90-25
Granger, Darryl	student	GS	96-12	Seidl, Michele A.	student	GS	92-10, 93-34
Grannan, Sabrina	student	AP	91-14	Siegmund, Oswald H. W.	faculty	AP	93-08
Harrison, Fiona A.	student	AP	91-26	Silk, Joseph I.	faculty	AP	90-25
Heimsath, Arjun M.	student	GS	95-38, 96-05	Spinrad, Hyron	faculty	AP	92-20, 93-05
Holliman, John H.	student	AP	94-32, 95-06	Stern, Laura A.	staff	HPS	92-06, 93-52
Hurley, Kevin C.	faculty	AP	90-13, 95-07	Stixrude, Lars	student	HPS	90-04, 91-46
Ingram, B. Lynn	faculty	GS	96-11	Truelove, J. Kelly	student	AP	95-06, 96-40
Jeanloz, Raymond	faculty	HPS	90-36, 91-51, 93-61, 94-44	Wang, Chi-Yuen	faculty	GS	92-29
Jeanloz, Raymond	faculty	GS	95-16, 96-18	Warren, John	student	AP	93-08
Johns, Christopher M.	student	AP	93-13	Welch, Jack	faculty	AP	92-48
Johnson, Lane R.	faculty	GS	96-20	Wenk, Hans-Rudolf	faculty	HPS	91-36, 92-06, 93-52, 94-38
Jones, David L.	faculty	GS	90-41	Woods, Tod	staff	AP	95-06
Kahn, Steven M.	faculty	AP	90-31, 91-26	Yang, T.-Y. Brian	staff	AP	93-12
				Zhang, Huoyi	student	HPS	93-47

\* AP=Astrophysics; GS=Geosciences; HPS=High-Pressure Sciences

## UC Davis

Name	Status	Field*	Grant #	Name	Status	Field*	Grant #
Bawden, Gerald	student	GS	93-41	Kellogg, Louise H.	faculty	GS	93-41
Becker, Robert	faculty	AP	90-05, 91-15, 95-02, 96-38	Klavins, Peter	staff	HPS	90-06
Chang, In-Chu	student	HPS	92-40	Lee, Insook	student	HPS	91-45
Claeys, Philippe	student	GS	90-37	Leshner, Charles E.	faculty	GS	95-45, 96-33
Donnellan, Andrea	staff	GS	93-41	Margolis, Stanley V.	faculty	GS	90-37
Dykes, John	student	HPS	90-06	Mosley, William D.	student	HPS	90-06
Fong, Ching-Yao	faculty	HPS	90-07, 91-45, 92-40	Perle, Rick	staff	AP	96-38
Fram, Miranda S.	faculty	GS	95-45	Pike, Christopher	student	HPS	92-39, 93-56
Gallup, Robert	student	HPS	90-07	Shelton, Robert N.	faculty	HPS	90-06, 94-40
Gettman, David	student	HPS	93-56	Spero, Howard	staff	GS	91-07
Goodwin, Tim	student	HPS	90-06	Taylor, Greg	student	AP	96-38
Helfand, David	staff	AP	96-38	Tinker, David	student	GS	96-33
Hepland, D.	staff	AP	90-05	Webb, David J.	faculty	HPS	92-39, 93-56
Irons, Stephen H.	student	HPS	94-40	White, Richard	staff	AP	90-05, 96-38
				Zoonematkermani	student	AP	90-05

## UC Irvine

Name	Status	Field*	Grant #
Duong, Hiep	student	GS	91-03
Duong, Hiep	student	HPS	93-50
Duong, Quynh	student	GS	91-03
Shih, Frank	student	HPS	93-50
Wolfenstine, Jeff	faculty	GS	91-03
Wolfenstine, Jeff	faculty	HPS	93-50
Wu, Tom	student	HPS	93-50



## UC Los Angeles

Name	Status	Field*	Grant #	Name	Status	Field	Grant #
Akers, William T.	student	GS	91-02, 92-02, 93-24	Leland, John	student	GS	95-26
Anderson, Orson	faculty	HPS	90-44, 92-38	Lenardic, Adrian	staff	GS	95-27
Ardell, Alan J.	faculty	HPS	94-47	Maheshwari, Abhay	staff	HPS	94-47
Baer, Bruce	student	HPS	90-02	Martin, Amy	student	HPS	92-44
Chan, Mike	student	HPS	92-44	Mastrodemos, Nickolaos	student	AP	94-22
Christie, John	faculty	HPS	90-46	McKeegan, Kevin D.	faculty	GS	91-02, 92-02, 92-03, 93-24, 94-18, 95-29, 96-19
Craig, Peter	student	GS	94-20				
Cynn, Hyunchae	student	HPS	90-02, 91-49, 92-44	Moresi, Louis N.	staff	GS	95-27
Cynn, Hyunchae	student	GS	95-20	Morris, Mark	faculty	AP	94-22
Davis, Paul	faculty	GS	90-40, 91-41	Mustonen, Susanna	student	HPS	91-49, 92-44
Du, A.	staff	GS	90-38	Nicol, Malcolm F.	faculty	HPS	90-02, 91-49, 92-44
Eichelberger, John C.	student	GS	91-33	Nicol, Malcolm F.	faculty	GS	95-20
Farber, Daniel L.	faculty	GS	94-18, 95-29, 96-19	Oda, Hitoshi	student	HPS	90-44
Gibson, Douglas	student	HPS	92-44	Potter, David	student	GS	93-40
Gratz, Andrew	student	HPS	90-46	Quidelleus, Xavier	student	GS	96-07
Grove, Martin	student	GS	91-02, 92-02	Reid, Mary R.	faculty	GS	95-26
Harrison, T. Mark	faculty	GS	91-02, 92-02, 93-24, 94-18, 94-11, 94-20, 95-28, 96-07	Reifschneider, Diane	faculty	GS	95-20
				Rumelhart, P.	student	GS	96-08
				Schubert, Gerald	faculty	GS	91-33
				Shalout, Ibrahim	student	HPS	91-49
Isaak, Donald	student	HPS	90-44	Slack, Philip	student	GS	90-40, 91-41
Jackson, David D.	faculty	GS	93-40	Warren, Paul	staff	HPS	93-55
Jacobinas, Richard	student	HPS	92-44	Wassan, John T.	faculty	HPS	93-55
Kagan, Yan	faculty	GS	93-40	Wasson, John T.	faculty	GS	90-38
Kaplan, Isaac R.	faculty	GS	92-13	Yin, An	faculty	GS	94-11, 94-20, 95-28, 96-07, 96-08
Kaula, William M.	faculty	GS	95-27				
Kerridge, John F.	faculty	GS	91-01	Zhou, L.	staff	GS	90-38
Knesel, Kurt	student	HPS	93-55				

\* AP=Astrophysics; GS=Geosciences; HPS=High-Pressure Sciences

## UC Riverside

Name	Status	Field*	Grant #
Cohen, Lewis	faculty	GS	90-33, 91-08
Rees, G. Richard	student	GS	90-33, 91-08

## UC San Diego

Name	Status	Field*	Grant #	Name	Status	Field*	Grant #
Agnew, Duncan Carr	faculty	GS	92-35	Maple, M. Brian	faculty	HPS	90-43, 91-50, 92-43, 93-57, 94-41
Arnold, James R.	faculty	GS	92-12	Maple, M. Brian	faculty	GS	95-32
Aster, Richard	student	GS	90-45	Marchant, Kari	student	GS	91-06, 92-07
Baker, G. Eli	student	GS	92-47, 93-44	Marti, Kurt	faculty	GS	94-21
Benson, David J.	faculty	HPS	92-41, 93-48	McKittrick, Joanna	faculty	HPS	92-42, 93-58, 94-45
Berger, Jonathan	faculty	GS	90-45	McKittrick, Joanna	faculty	GS	95-30
Chastain, Roger A.	staff	GS	93-36	McLaughlin, Gail C.	student	AP	94-30, 95-09
Chau, Ricky	student	HPS	93-57, 94-41	Minster, Jean B.	faculty	GS	92-47, 93-44
Chau, Ricky	student	GS	95-32	Morgan, Jason Phipps	faculty	GS	94-03, 95-43, 96-26
Constable, Steven	faculty	HPS	91-47	Nishiizumi, Kunihiko	faculty	GS	92-12
Constable, Steven	faculty	GS	93-26, 94-12, 95-18, 96-27	Nishiizumi, Kunihiko	staff	GS	94-21
Earle, Paul	student	GS	94-04, 95-42, 96-29	Paulius, Lisa M.	student	HPS	92-43
Early, Edward A.	student	HPS	90-43	Qian, Yongzhong	student	AP	90-08, 91-24, 92-27, 93-22
Freim, John	student	HPS	93-58, 94-45	Scott, Jennifer	student	GS	90-45
Freim, John	student	GS	95-30	Seaman, Christopher L.	student	HPS	90-43, 91-50, 92-43
Fuller, George M.	faculty	AP	90-08, 91-24, 92-27, 93-22, 94-30, 95-09	Shearer, Peter	faculty	GS	94-04, 95-42, 96-29
Graf, Thomas	staff	GS	94-21	Staudigel, Hubert	faculty	GS	91-06, 92-07, 93-36
Gu, Zhaoyan	student	GS	94-48, 95-31	Tunaboylu, Bahadir	student	HPS	92-42
Han, Seungho	student	HPS	91-50, 92-43	Yale, Mara	student	GS	94-03, 95-43, 96-26
Jedamzyk, Karsten	student	AP	90-08, 91-24, 92-27, 93-22	Yayanos, A. A.	faculty	GS	93-36
Johnson, Hadley O.	student	GS	92-35	Zumberge, Mark A.	faculty	GS	90-18
Kim, Yoosook	student	GS	94-21				
Lal, Devendra	faculty	GS	93-29, 94-48, 95-31				

## UC Santa Barbara

Name	Status	Field*	Grant #	Name	Status	Field*	Grant #
Angione, John	student	AP	93-16	Lees, Jonathan M.	staff	GS	93-39
Antonucci, Robert	faculty	AP	95-13, 96-35	Lindley, Grant	student	GS	91-39, 92-30
Archuleta, Ralph	faculty	GS	91-39, 92-30	Lubin, Philip	faculty	AP	93-17
Boles, James R.	faculty	GS	93-31	Meinhold, Peter	staff	AP	93-17
Danen, Robert M.	student	AP	91-18	Nicholson, Craig	faculty	GS	93-39
Dey, Arjun	student	AP	95-13	Rhie, Sun Hong	staff	AP	93-17
Edward Bowell	staff	AP	93-16	Schuster, Jeff	student	AP	93-17
Fain, Sean	student	GS	91-07	Shoemaker, Eugene	staff	AP	93-16
Gaier, Todd	student	AP	93-17	Spera, Frank J.	faculty	GS	90-20
Gunderson, Jeff	student	AP	93-17	Steck, Lee	faculty	GS	92-31
Gwinn, Carl R.	faculty	AP	91-18	Stein, Daniel J.	student	GS	90-20
Hurt, Todd	student	AP	95-13, 96-35	Stubbs, Charistopher W.	faculty	AP	93-16
Lea, David W.	faculty	GS	91-07, 93-31	Weiland, Charles	student	GS	92-31
Lee, Yong I.	staff	GS	93-31				

# UC Santa Cruz

Name	Status	Field*	Grant #	Name	Status	Field*	Grant #
Ammon, Charles J.	faculty	GS	92-36, 93-43, 94-10, 96-22	Lawrence, Jacob	student	GS	96-23
Bradford, L. William	student	AP	91-53, 92-28, 93-19, 94-33	Lay, Thorne	faculty	GS	95-40, 96-22
Brodie, Jean P.	faculty	AP	90-29	Lundstrom, Charles C.	student	GS	94-15, 95-36, 96-31
Cameron, Ken	faculty	GS	92-32	Mooney, Walter D.	staff	GS	96-22
Cervantes, Phillip	student	GS	95-25	Meyer, B. S.	staff	AP	93-11
Donnelly, Ralph Hanks	student	AP	90-29	Protti, Marino	student	GS	93-42
Estes, James	staff	GS	90-27	Revenaugh, Justin	faculty	GS	96-23
Farber, Daniel L.	student	GS	90-16, 91-12, 93-33, 94-15	Ritson, Peter	student	GS	90-27, 91-13
Faust, Jessica	student	GS	95-25	Schwartz, Susan Y.	faculty	GS	90-21, 93-42, 94-05, 95-40
Flatte, Stanley M.	faculty	AP	91-53, 92-28, 93-19, 94-33	Smith, Donald	student	GS	90-27, 91-13
Flegal, A. Russell	faculty	GS	90-27, 91-13	Trump, Steen	student	GS	90-27
Garrison, David	staff	GS	90-27, 91-13	Verdonck, David	student	GS	91-42
Gill, Cliff	student	GS	93-33	Vidale, John	faculty	GS	90-39, 91-42
Haggerty, Michael	student	GS	96-23	Williams, Quentin	faculty	GS	90-16, 91-12, 93-33, 94-15, 95-36, 96-31
Hernquist, Lars	faculty	AP	92-22	Woosley, Stanford	faculty	AP	92-24, 93-11, 94-29
Hoffman, Robert D.	student	AP	92-24, 93-11, 94-29	Zhang, Jiajun	faculty	GS	93-45, 94-02, 95-47
Houston, Heidi	student	GS	90-39	Zhang, Tian-Run	staff	GS	95-40
Houston, Heidi	faculty	GS	90-24, 91-42	Zhang, Yu-Shen	faculty	GS	95-41, 96-22
Knittle, Elise	faculty	GS	95-25				
Kuentz, David	student	GS	92-32				

## LLNL — Laboratory Scientists

Name	Field*	Grant #	Name	Field*	Grant #
Akella, Jagan	HPS	91-51	Erskine, David J.	HPS	92-38
Akella, Jagan	GS	95-20	Esser, Bradley	GS	91-13, 91-06
Alcock, Charles R.	AP	90-08, 91-24, 92-27, 93-16	Finkel, Robert C.	GS	92-10, 92-12, 93-29, 93-34, 94-13, 94-20, 94-21, 94-48, 95-26, 95-31, 95-38, 96-05, 96-08, 96-12
Aufderheide, Maurice	AP	91-24			
Ball, J. Roger	AP	90-09, 91-18			
Bazan, Jeanne	GS	91-13	Frank, Matthias	AP	96-41
Beck, Susan L.	GS	90-24, 90-21	Gerlack, David C.	GS	90-41
Beeman, Mark	GS	91-03	Goldstein, William H.	AP	90-31
Beeman, Mark	HPS	93-50	Gratz, Andrew J.	HPS	92-06, 93-52, 93-55, 93-61
Bell, John	AP	94-32, 95-06			
Bennett, David	AP	92-22, 93-17	Greenough, Jeffrey	AP	94-32, 95-06
Bixler, Jay	AP	90-29	Hailey, Charles	AP	90-29, 91-26
Boercker, David B.	HPS	90-04, 91-46, 93-47	Hawley, Suzanne L.	AP	93-13
Bourcier, William B.	GS	91-02, 93-36	Holmes, Neil C.	HPS	92-39, 93-56
Brocius, Wayne	HPS	90-46	Hoshino, Masahiro	AP	90-14, 91-27
Brookshaw, Leigh	AP	91-15	Howard, William M.	AP	92-24
Bruton, Carol J.	GS	93-31	Howell, Louis H.	AP	94-32, 95-06
Buchholtz-ten Brink, Marilyn R.	GS	90-41, 91-06, 92-07	Hudson, G. Bryant	GS	92-10, 92-12, 93-34
Caffee, Marc W.	GS	92-10, 92-12, 93-29, 93-34, 94-13, 94-20, 94-21, 94-48, 95-26, 95-31, 96-08	Hutcheon, Ian	GS	96-11, 96-33
			Hutchings, Larry	GS	96-10
			Jarpe, Steve	GS	91-39, 92-30
			Jedamzik, Karsten	AP	95-09
Carrigan, Charles R.	GS	91-33, 94-03, 95-43	Kasameyer, Paul W.	GS	90-18
Castor, John I.	AP	94-22	Kersting, Annie B.	GS	95-45
Cimatti, Andrea	AP	95-13	Keto, Eric	AP	90-05
Cook, Kem	AP	90-29	Keto, Eric	AP	90-09
Dalhede, Samuel	AP	92-21	Klein, Richard I.	AP	94-32, 95-06, 96-40
Davis, Jay C.	GS	92-13	Knauss, Kevin	GS	92-07
Dearborn, David P.	AP	90-08, 90-25, 91-24, 92-27	Kurki-Suonio, Hannu	AP	90-08, 91-24
Dermer, Charles	AP	90-13	Labov, Simon	AP	91-14, 96-41
Deustua, Susana	AP	91-15	Larsen, Shawn	GS	94-07, 96-04
Duba, Alfred	HPS	90-44, 91-47	Liang, Edison	AP	90-13
Duba, Alfred	GS	93-26, 94-12, 95-18	Mailhiot, Christian	HPS	90-07, 91-45, 92-40
Durham, William B.	HPS	91-36, 92-06, 93-52, 94-38	Malaney, Robert	AP	90-08, 92-27

\* AP=Astrophysics; GS=Geosciences; HPS=High-Pressure Sciences

## LLNL — Laboratory Scientists (cont.)

Name	Field*	Grant #	Name	Field*	Grant #
Mathews, Grant J.	AP	90-08, 91-24, 92-24, 92-27, 93-11, 93-22, 94-29, 94-30	Ryerson, Frederick (cont.)	GS	93-24, 93-33, 94-11, 94-15, 94-18, 94-20, 95-28, 95-29, 95-36, 96-07, 96-08, 96-19, 96-31, 96-33
Mauche, Christopher W.	AP	93-08	Ryerson, Frederick	HPS	94-47
Max, Claire E.	AP	90-14, 91-53, 91-27, 92-23, 92-28, 93-19, 94-33	Scott, Howard A.	AP	93-08
Mayeda, Kevin	GS	93-46, 95-40, 96-20	Shaw, Henry	GS	94-15, 95-36
Mayle, Ron	AP	92-27, 93-22, 94-30	Skinner, Christopher J.	AP	92-48, 93-07
McKeegan, Kevin D.	GS	91-01	Smith, Albert	GS	90-45
McMahan, Andrew	HPS	90-07	Southern, John R.	GS	93-29, 94-48, 95-31
Mears, Carl A.	AP	96-41	Sweeney, Jerry	GS	92-29
Meyer, Bradley S.	AP	90-08, 91-24	Tavani, Marco	AP	91-27, 92-23
Moriarty, J. A.	HPS	90-36	Thorpe, Richard	GS	90-33, 91-08
Nellis, William J.	HPS	90-43, 90-46, 91-50, 92-06, 92-41, 92-42, 92-43, 93-48, 93-55, 93-57, 93-58, 93-61, 94-41, 94-44, 94-45	Tipton, Robert	HPS	92-41
			Tobin, James	HPS	91-48
Nellis, William J.	GS	95-16, 95-30, 95-32, 96-18	van Breugel, Willem	AP	91-15, 92-20, 93-05, 95-02, 95-13, 96-35, 96-38
Niemeyer, Sidney	GS	90-27, 90-38, 91-13, 92-32	Volpe, Alan M.	GS	95-45
			Walter, William R.	GS	93-45, 94-04, 94-02, 95-40, 95-42, 95-47, 96-23, 96-29
Osterheld, Albert L.	AP	90-31	Weaver, Thomas	AP	92-21, 95-09
Patton, Howard	GS	92-36, 93-43, 95-40, 95-41, 96-22	Weber, Marvin J.	HPS	92-44
Phinney, Douglas	GS	91-01, 91-06, 92-07	Week, Homer	GS	90-20
Radousky, Harry	HPS	90-06, 94-40	Weir, Samuel T.	HPS	90-43, 91-50
Reichlin, Robin L.	HPS	90-06	Williams, Charles	GS	95-27
Reichlin, Robin L.	GS	95-25	Wilson, James R.	AP	92-27, 93-11, 93-22, 94-29, 94-30, 95-09
Rice, David	GS	90-33, 91-08	Yang, Lin H.	HPS	93-47
Roberts, Jeffrey	GS	96-27	Yoo, Choong-Shik	HPS	91-49, 92-39, 93-56
Ross, Marvin C.	HPS	90-02	Yoo, Choong-Shik	GS	95-20
Rundle, John	GS	92-35, 93-40, 93-41	Young, David	HPS	90-02
Rupert, Stanley	GS	94-05	Zandt, George	GS	90-39, 90-40, 91-41, 91-42, 92-47, 93-42, 93-44, 94-04, 94-05, 94-03, 94-10, 95-43, 96-26, 96-29
Ruppert, Stanley	GS	94-10, 96-26			
Russ III, G. Price	GS	90-27, 90-38, 90-41, 90-37, 91-07	Ziock, Klaus P.	AP	91-26, 95-07
Ryerson, Frederick	GS	90-20, 90-16, 91-02, 91-12, 92-02, 92-03,	Zucca, Jay	GS	92-31, 93-39

---

## **Appendix B**

**IGPP–LLNL Seminars &  
Workshops, 1990–1995**

---





## Seminars

January 5, 1990

“Chemodynamical Evolution of the Galaxies”  
Andy Burkhard; University of Illinois, Urbana

January 12, 1990

“Black Holes, the QCD Phase Transition, and Nucleosynthesis”  
Eric Carlson; Lawrence Berkeley Laboratory

January 19, 1990

“Lithium in AGB Stars”  
Vern Smith; University of Texas at Austin

January 26, 1990

“Compton Scattering in Strong Magnetic Fields and the Continuum Spectra of Gamma-Ray Bursts”  
Chuck Dermer; LLNL and Space Science Laboratory, Berkeley

February 2, 1990

“Mapping of the Universe”  
Margaret Geller; Harvard Smithsonian, Center for Astrophysics, Cambridge, MA

February 15, 1990

“Model for Active Galactic Nuclei”  
Amri Wendell; Weizmann Institute, Israel

February 16, 1990

“Quarks in the Early Universe”  
Craig Hogan; University of Arizona, Tucson

February 23, 1990

“The Decline and Fall of Classical Novae”  
James Truran; University of Illinois, Urbana

March 9, 1990

“Instabilities Mixing and Clumping in SN 1987A”  
Bruce Fryxell; University of Arizona, Tucson

March 12, 1990

“Is There a Primordial R-Process?”  
R. K. Thielemann; Harvard Smithsonian Center for Astrophysics, Cambridge, MA

March 16, 1990

“Domain Walls in the Early Universe”  
Larry Kawano; California Institute of Technology

March 23, 1990

“Periodicity in the Large Scale Distribution of Galaxies”  
David Koo; UC Santa Cruz

March 26, 1990

“Relativistic Shocks in Pulsar Winds”  
Jonathan Arons; UC Berkeley

March 30, 1990

“Recent Results of Coded Aperture Gamma Ray Observations of the Galactic Center and SN 1987A”  
Tom Price; California Institute of Technology

April 5, 1990

“Mixing in SN 1987A”  
Ken Nomoto; University of Tokyo

April 6, 1990

“Galactic Chemical Evolution”  
Grant Gazan; University of Illinois, Urbana

April 18, 1990

“The Spectrum and Intensity of the Cosmic X-Ray Background”  
Xiaoyi Wu; Columbia University, NY

April 20, 1990

“Extended Inflation”  
E. . Kolb; Fermilab and University of Illinois, Urbana

April 23, 1990

“Accretion-Powered White-Dwarf Pulsars”  
Joseph Patterson; Columbia University, NY, and UC Los Angeles

## Appendix B

---

April 25, 1990

"Evolution of Pulsars: Our Most Accurate Clocks"

Roger Romani; Institute for Advanced Study, NJ

April 27, 1990

"High Resolution Optical Absorption Studies of the Local Interstellar Medium"

Barry Y. Welsh; Space Sciences Laboratory, UC Berkeley

May 4, 1990

"A New Model for  $10^{15}$  eV Gamma Ray Sources"

Ian Smith; Washington University at St. Louis

May 9, 1990

"Gamma Rays from Neutron Stars"

Malvin Ruderman; Columbia University, NY

May 11, 1990

"Equation of State for Neutron Stars"

William Meyers; Lawrence Berkeley Laboratory

May 11, 1990

"Evolution Statistics and Birthrates of Pulsars"

Jeremiah Ostriker; Princeton University, NJ

May 14, 1990

"Simulation of Bounded Multiscale Plasmas"

Scott Parker; UC Berkeley

May 18, 1990

"Q Stars"

Safi Bahcall; Stanford Linear Accelerator Center

May 25, 1990

"Physics on the Edge: Brown Dwarfs and Low Mass Stars"

Adam Burrows; University of Arizona, Tucson

June 1, 1990

"Modeling the Dynamics of the Interstellar Medium"

Eric Keto; LLNL

June 8, 1990

"Neutrinos in the Early Universe"

Robert Malaney; LLNL

June 22, 1990

"High Temperature Neutrino Interaction Stellar Collapse"

Bradley S. Meyer; LLNL

July 6, 1990

"Chaos in the Mixmaster Universe: The Real Story"

Beverly K. Berger; Oakland University, MI

July 13, 1990

"Pre-Main-Sequence Lithium Burning in the Hyades and the Sun"

Fritz Svensson; UC Santa Cruz

July 20, 1990

"New Astrophysical Opacities"

Forrest Rogers and Carlos Iglesias; LLNL

July 27, 1990

"Direct Reaction Mechanisms at Thermonuclear Energies"

H. Oberhummer; Vienna, Austria

August 3, 1990

"Primordial Black Holes"

Lawrence Hall; Lawrence Berkeley Laboratory

August 24, 1990

"Damped Lyman  $\alpha$  Absorption Systems: Progenitors of Galactic Disks"

Art Wolfe; UC San Diego

September 14, 1990

"Evolution of Quasars and Radio Galaxies"

Vijay Kapahi; TATA Institute for Fundamental Research, India

September 21, 1990

"Star Formation, Structure and Kinematics of Molecular Clouds"

John Bally; Bell Laboratories, NJ

September 28, 1990

"The Search for Supermassive Black Holes"

Andrew Wilson, University of Maryland, College Park

October 5, 1990

"A Comparison of Triton's and Pluto's Atmospheres"

Don Hunten; University of Arizona, Tucson

October 12, 1990

"Halos of Molecular Clouds"

Peter Wannier; Jet Propulsion Laboratory, Pasadena

October 19, 1990

"Properties of Rotating, General Relativistic  
Neutron Stars"

Fridolin Weber; Lawrence Berkeley Laboratory

October 26, 1990

"Blazars: Faster than Light"

Chris Impey; Steward Observatory, University of Arizona,  
Tucson

November 9, 1990

"Imaging Jupiter's Magnetosphere"

Nick Schneider; University of Colorado, Boulder

November 16, 1990

"HI in Galaxies"

Jacqueline van Gorkom; Columbia University, NY

December 7, 1990

"On the Nature and Evolution of Windy Binary Pulsars"

Jacob Shaham; Columbia University, NY

December 14, 1990

"Magnetic Field Reconnection in Astrophysics"

Claire E. Max; LLNL

December 20, 1990

"2D Simulations of MHD Flows in Astrophysics"

Kevin Lind; Naval Research Laboratory

February 19, 1991

"Delectability of Gravitational Radiation from Stellar  
Core Collapse"

L. Samuel Finn; Cornell University, Ithaca, NY

February 22, 1991

"Relativistic Neutrons in Broad-Absorption-Line Quasars"

Mitch Begelman; University of Colorado, Boulder

March 1, 1991

"Photoionization-Regulated Star Formation and the  
Structure of Molecular Clouds"

Chris McKee; UC Berkeley

March 4, 1991

"Axions in Space"

Ted Ressel; University of Chicago, Illinois

March 8, 1991

"Opacities in Plasmas"

Dimitri Mihalas; University of Illinois, Urbana

March 15, 1991

"Extended Stellar Hydrodynamics"

Peter Amendt; LLNL

March 22, 1991

"What One Can Learn from Gravitational Lenses"

Chris Kochanek; UC Berkeley

March 26, 1991

"Viscous Evolution of the Disk of Spiral Galaxies"

Scot Olivier; UC Santa Cruz

April 12, 1991

"Baryonic Dark Matter"

Joseph Silk; UC Berkeley

April 18, 1991

"Simulation Study of Ion Two-Stream Instability in the  
Auroral Acceleration"

Perry C. Gray; Dartmouth College, Hanover, NH

April 19, 1991

"Evolution of Neutron Star Binaries and the Formation  
of Millisecond Pulsars"

Edward vanden Heuvel; University of Amsterdam, The  
Netherlands

May 3, 1991

"Observational Evidence on Magnetic Field Decay in  
Neutron Stars"

Frank Verbunt; University of Amsterdam, The Netherlands

May 24, 1991

"The Origin of the X-Ray Background"

David Helfand; Columbia University, NY

June 6, 1991

"The Wind in Cyg X-3: Observational Evidence"

Larry Molnar; University of Iowa, Iowa City

## Appendix B

---

- |   |   |
|---|---|
| June 7, 1991<br>"Inflationary Models: Minimal Cosmic Microwave Background Anisotropies"<br>Krzysztof Gorski; Princeton University, NJ                     | October 4, 1991<br>"Optical Signatures of Cooling Flows in Elliptical Galaxies"<br>Susana Deustua; LLNL   |
| June 13, 1991<br>"Numerical Simulation of Fragmentation: A Model for the Giant HII Region W49"<br>John Lattanzio; Monash University, Melbourne, Australia | October 11, 1991<br>"Cosmological Implications of Whole-Sky Redshift Surveys"<br>Marc Davis; UC Berkeley  |
| June 14, 1991<br>"Neutron Diffusion in Primordial Nucleosynthesis"<br>Banerjee Bishu; Princeton University, NJ  | October 18, 1991<br>"A Compton Reflection Model for the Cosmic X-Ray and Gamma-Ray Background"<br>Robert Rogers; LLNL                                       |
| June 24, 1991<br>"First Gammas on BATSE: GRO Observes Gamma-Ray Bursts"<br>David Band; UC San Diego   | October 25, 1991<br>"Shock Precursors and the Onset of Cooling Behind Fast Shocks in the Cygnus Loop"<br>Jeff Hester; Arizona State University, Tempe       |
| July 5, 1991<br>"The Fueling of Active Galaxies"<br>Lars Hernquist; UC Santa Cruz   | October 28, 1991<br>"On Protons and Dileptons as Signals of the Quark-Gluon Plasma"<br>Dinesh Srivastava; Variable Energy Cyclotron Center, Calcutta, India |
| August 2, 1991<br>"New Nuclear Mass Calculation and Its Implications for Astrophysical Calculations"<br>Peter Moller; Los Alamos National Laboratory, NM  | November 1, 1991<br>"Astrophysical Hot Hydrogen Burning Reaction Rates"<br>Pierre Auger; Laboratoire des Spectrometrie, Orsay, France                       |
| August 8, 1991<br>"Problems in Theoretical Nuclear Astrophysics"<br>Karl Heinz Langanke; University of Munster, Germany                                   | November 5, 1991<br>"High-Pressure and Magnetic Relaxation Measurements on $Y_{1-x}Pr_xBa_2Cu_3O_7$ "<br>Lisa Paulius; UC San Diego                         |
| August 9, 1991<br>"GCD: The Globular Cluster Tale"<br>Andy Burkert; UC Santa Cruz and MPI, Munich   | November 7, 1991<br>"Early Stages of Terrestrial Planet Formation"<br>Glenn Stewart; University of Colorado, Boulder  |
| August 16, 1991<br>"Observations of Intermediate Age: Supernovae"<br>John Cowan; Columbia University, NY  | November 8, 1991<br>"First Results from the Compton Gamma-Ray Observatory"<br>Neil Gehrels; NASA, Goddard Space Flight Center, Greenbelt, MD                |
| September 20, 1991<br>"Automated Discovery of Nearby and Distant Supernovae"<br>Saul Perlmutter; UC Berkeley  |   |
| September 27, 1991<br>"Bow Shock Models of Ultracompact HII Regions"<br>Mordecai-Mark Mac Low; UC Berkeley and NASA, Ames                                 |   |
-

November 15, 1991

“An Obstacle to Building a Time Machine”

Alan Guth; Massachusetts Institute of Technology,  
Cambridge, MA

November 22, 1991

“Barium Stars and Related Binaries”

Peter Eggleton; Institute of Astronomy, Cambridge,  
England

November 26, 1991

“A Self-Consistent Theory of Collisionless Relaxation:  
How to Find Globally Stable Final States”

Heinz Wiechen; Ruhr Universitat, Dochem, Germany

December 3, 1991

“Recent ROSAT Observations of X-Ray Sources”

Tomaso Belloni; Max-Planck Institut, Garching, Germany

December 6, 1991

“‘Hidden’ Millisecond Pulsars: A New Class of Gamma-  
Ray Sources”

Marco Tavani; LLNL

December 13, 1991

“Magnetic Fields in Star-Forming Regions”

Ellen Zweibel; University of Colorado, Boulder

December 20, 1991

“New Results from GRO”

Edison Liang; Rice University, Houston, TX

January 10, 1992

“Shells, Supershells, Worms, and Chimneys in the  
Interstellar Medium”

Carl Heiles; UC Berkeley

January 17, 1992

“Planet Formation”

Jack Lissauer; State University of New York, Stony Brook

January 24, 1992

“Low-Surface Brightness Galaxies”

Greg Bothun; University of Oregon, Eugene

January 31, 1992

“A Magnetically Heated Galactic Halo”

John Raymond; Center for Particle Astrophysics

February 7, 1992

“ROSAT Observations of Supernova Remnants and the  
Interstellar Medium”

Bernard Aschenback; Max-Planck-Institut für  
Extraterrestrische Physik, Garching, Germany

February 14, 1992

“UV Pulsations from Massive X-Ray Binaries”

Tim Kallman; NASA, Goddard Space Flight Center,  
Greenbelt, MD

February 18, 1992

“Type I Supernovae and the Duration of the Formation of  
the Galactic Stellar Halo”

Tammy A. Smecker; Johns Hopkins University,  
Baltimore, MD

February 19, 1992

“New Approach to Determining the Gruneisen Parameter”  
Orson Anderson; UC Los Angeles

February 21, 1992

“Lyman- $\alpha$  Clouds as a Probe of the Intergalactic Medium”  
Jane C. Charlton; University of Arizona, Tucson

February 21, 1992

“Observations and Theory of Stellar Flares”

Suzanne Hawley; LLNL

February 28, 1992

“Direct Measurements of Stellar Magnetic Fields”

Gibor Basri; UC Berkeley

March 6, 1992

“Very Long Baseline Infrared Interferometry”

Bill Danchi; UC Berkeley

March 12, 1992

“Is Inflation Fine-Tuned?”

Bharat Ratra; California Institute of Technology

March 13, 1992

“Pre-White Dwarf Evolution”

Volker Weidemann; Institut für Theoretische Physik and  
Sternwarte der Universität Kiel, Germany

## Appendix B

---

- March 20, 1992  
"Large-Scale Structure in the Northern Sky"  
Stephane Courteau; Cornell University, Ithaca, NY
- March 27, 1992  
"ROSAT X-Ray Observations and the Stellar Coronal Dividing Line"  
Bernard Haisch; Lockheed, Palo Alto Research Laboratory
- April 3, 1992  
"What Regulates Star Formation in Galaxies?"  
Robert Kennicutt; Steward Observatory, University of Arizona, Tucson
- April 10, 1992  
"Starburst-Driven Galactic Superwinds"  
Timothy Heckman; Space Telescope Science Institute and Johns Hopkins University, Baltimore, MD
- April 17, 1992  
"The Tully-Fisher Relation Using CO Emission Lines"  
John Dickey; University of Minnesota, Minneapolis
- April 24, 1992  
"A Comparison of the Atmosphere-Surface Relationships Between Mercury and the Moon"  
Ann Sprague; Lunar and Planetary Laboratory, University of Arizona, Tucson
- April 29, 1992  
"High-Pressure Sintering and Deformation of Silica Aggregates"  
Mark Beeman; LLNL
- May 1, 1992  
"Measuring the Universe with Supernovae"  
Robert Kirshner; Harvard University, Cambridge, MA
- May 8, 1992  
"Cosmological Evolution of Accretion Disks and Quasars"  
Vahe Petrosian; Stanford University
- May 15, 1992  
"The Galaxy at Faint Magnitudes: Constraints on the Evolution of the Milky Way"  
Steven Majewski; Observatories of the Carnegie Institute of Washington
- May 22, 1992  
"The Las Campanas Fiber-Optic Redshift Survey: The End of Large-Scale Structure"  
Stephen Shectman; Observatories of the Carnegie Institute of Washington
- May 29, 1992  
"Rocket-Borne Observations of [CII] 158- $\mu$ m Emission from the Diffuse Interstellar Medium"  
Jamie Bock; UC Berkeley
- June 5, 1992  
"COBE Observations of the Anisotropy of the Cosmic Microwave Background"  
Charles Lineweaver; Lawrence Berkeley Laboratory
- June 12, 1992  
"Signal Detection and Supercomputing in the Search for Extraterrestrial Intelligence"  
Kent Cullers; NASA, Ames
- June 18, 1992  
"BATSE Observations of Gamma-Ray Bursts"  
David Band; UC San Diego
- June 19, 1992  
"Comets, Craters, and Catastrophes"  
Eugene Shoemaker; U.S. Geological Survey, Menlo Park
- June 26, 1992  
"A Large Arc Near the Double Quasar 0957+561: Gravitational Lensing, Dark Matter, and the Hubble Constant"  
Gary Bernstein; University of Arizona, Tucson
- July 10, 1992  
"Nuclear Interaction Rates for Dark Matter Detectors"  
Ted Ressel; LLNL
- July 17, 1992  
"Initial Observations of the Solar Corona from Yohkon"  
Keith Strong; Lockheed, Palo Alto Research Laboratory
-

July 22, 1992

“Type II Supernovae and the Equation of State of Dense Matter”

F. D. Swesty; State University of New York, Stony Brook

July 24, 1992

“Magnetic Fields in Clusters of Galaxies”

Yoel Rephaeli; UC San Diego

July 31, 1992

“Mass Loss from Cool Evolved Stars”

Chris Skinner; UC Berkeley

August 7, 1992

“IRAS Images and the History of Variable Mass Loss from Red Giant Stars”

George Hawkins; LLNL

August 14, 1992

“Topics in Gamma-Ray Astrophysics”

Edison P. Liang; Rice University, Houston, TX, and LLNL

August 21, 1992

“High Spectral Resolution Gamma-Ray Observations on the Galactic Center Region”

Bob Lin; UC Berkeley

August 27, 1992

“Starburst-Driven Superwinds”

Matthew D. Lehnert; Johns Hopkins University, Baltimore, MD

August 28, 1992

“New News about Nu’s”

Sidney Bludman; University of Pennsylvania, Philadelphia, and Center for Particle Astrophysics

September 4, 1992

“The Puzzle of Giant Ionized Gas Filaments in Irregular Galaxies”

Diedre Hunter; Lowell Observatory Flagstaff, AZ

September 11, 1992

“Neutrino Oscillations, Closure Mass Neutrinos, and Supernovae”

George Fuller; UC San Diego

September 18, 1992

“Millimeter-Wave Measurements of the Sunyaev-Zeldovich Effect: A New Tool for Observational Cosmology”

Marc Fischer; UC Berkeley

September 25, 1992

“A Random Walk Through the Solar Corona”

Tim Bastian; National Radio Astronomy Observatory, Socorro, NM

October 2, 1992

“Photodissociation Regions in Planetary Nebulae”

James Graham; UC Berkeley

October 9, 1992

“Collapse of Magnetized Clouds”

Daniele Galli; UC Berkeley

October 13, 1992

“Angular Momentum Transport Dynamo Activity in Thin Accretion Disks”

Pat Diamond; UC San Diego

October 16, 1992

“The Ultraviolet Spectra of Star-Forming Galaxies”

Anne Kinney; Space Telescope Science Institute, Baltimore, MD

October 30, 1992

“Constraints on the s-Process in Stellar Models from Experimental Nuclear Measurements”

Franz Kappeler; Institut für Kernphysik, Karlsruhe, Germany

October 30, 1992

“Geminga: King of the Gamma-Ray Pulsars”

Jules Halpern; Columbia University, NY

November 3, 1992

“Search for  $^{138}\text{La}$  Isotopic Anomaly and the Nucleosynthetic Origin of  $^{26}\text{Al}$ ”

Typhoon Lee; UC Berkeley

November 6, 1992

“Cooling Flows and Clusters of Galaxies”

Richard Mushotzky; NASA, Goddard Space Flight Center, Greenbelt, MD

## Appendix B

---

November 13, 1992  
"Voyages to Giant Planet Magnetospheres"  
Fran Bagenal; University of Colorado, Boulder

November 20, 1992  
"An Overview of Recent Results from the Ulysses X-Ray Experiment"  
Kevin Hurley; UC Berkeley

November 23, 1992  
"Isotopic Si Anomalies in SiC Meteoritic Grains"  
Roberto Gallino; Instituto di Fisica Generale deli'  
Universita Torino

December 4, 1992  
"Hard-X-Ray Spectra and Quasi-Periodic Oscillations of Black-Hole Candidates: Recent Results from Franat and MIR"  
Rashid Synyaev; Space Research Institute of the Academy of Science, Moscow, Russia

December 4, 1992  
"Probing the Radial Age/Metallicity Degeneracy in Early-Type Galaxies"  
David Silva; National Optical Astronomical Observatory, Tucson, AZ

December 9, 1992  
"Cosmological 'Seed' Magnetic Field from Inflation"  
Bharat Ratra; Princeton University, NJ

December 10, 1992  
"The Age Metallicity Relation of the LMC as Seen from Clusters and Field Stars"  
Ed Olszewski; University of Arizona, Tucson

December 18, 1992  
"Large-Scale Dynamics from Peculiar Velocities"  
Avishai Dekel; Hebrew University of Jerusalem, Israel

January 22, 1993  
"Absolute Magnitudes of RR Lyrae Variables,  $H_0$  and  $\Omega$ "  
Allan Sandage; Observatories of the Carnegie Institute of Washington

January 29, 1993  
"Physics and Astrophysics of Quark-Gluon Plasmas"  
Charles Alcock; LLNL

January 29, 1993  
"Keck Telescope Status Report"  
Claire Max; LLNL

February 5, 1993  
"Degree-Scale CXBR Anisotropy Studies: Results from the Comparisons Between MAX Measurements and UCSB South Pole HEMT Measurements"  
Peter Meinhold; UC Santa Barbara

February 11, 1993  
"Photoevaporating Clouds in Orion"  
Peter McCullough; UC Berkeley

February 12, 1993  
"Energetic Electrons in Jupiter's Magnetosphere"  
Imke de Pater; UC Berkeley

February 19, 1993  
"Origin and Evolution of Comets"  
Jane Luu; UC Berkeley

February 26, 1993  
"The Nucleosynthesis History of  $\omega$  Centauri"  
George Wallerstein; University of Washington, Seattle

March 4, 1993  
"Radiative Transfer in Homogeneous Spherical Clouds"  
Hendrik van de Hulst; Leiden University, The Netherlands

March 5, 1993  
"Winds from Late-Type Stars"  
Moshe Elizur; University of Kentucky, Lexington

March 9, 1993  
"Far-Infrared Line Images of Galaxies"  
Sue Madden; Max-Planck-Institut für Extraterrestrische Physik, Garching, Germany

March 12, 1993  
"Emission Line Nebulae in Cluster Cooling Flows"  
Megan Conahue; Observatories of the Carnegie Institute of Washington

March 19, 1993  
"A Baryonic Universe: What You See Is What There Is"  
Jeremiah P. Ostriker; Princeton University, NJ



March 19, 1993

"The History of the Galactic Bulge"

Mike Rich; Columbia University, NY

March 26, 1993

"First Observation of Extragalactic TeV Gamma Rays"

Carl Akerlof; University of Michigan, Ann Arbor

April 2, 1993

"The First Data from the MACHO Project"

David Bennett; LLNL

April 9, 1993

"The Emergence of Magnetic Flux through Stellar Interiors"

George Fisher; UC Berkeley

April 16, 1993

"Near Constraints on the Evolution of Faint Blue Galaxies"

Matt Bershad; UC Santa Cruz

April 23, 1993

"Nucleosynthesis by Asymptotic Giant Branch Stars in the Small Magellanic Cloud"

David Lambert; University of Texas at Austin

April 30, 1993

"Recent Results from the Extreme Ultraviolet Explorer"

Stuart Bowyer; UC Berkeley

May 3, 1993

"High-Energy Variability in Active Galactic Nuclei"

Rick Edelson; NASA, Goddard Space Flight Center, Greenbelt, MD

May 7, 1993

"Galaxy Chemistry"

John Huchra; Harvard University, Cambridge, MA

May 12, 1993

"New Telescope Optics: Large, Fast, and Adaptive"

Roger Angel; University of Arizona, Tucson

May 21, 1993

"A New URCA Process"

Maurice Aufderheide; LLNL

May 25, 1993

"IR Spectra of Post-AGB Stars"

Kay Justtanont; Institut d'Astrophysique, Paris, France

May 28, 1993

"Gamma-Ray Jets"

Roger Blandford; California Institute of Technology

June 11, 1993

"X-Ray Spectroscopy with XSPECT/SODART Telescopes of Spectrum X-Gamma"

Herb Schnopper; Danish Space Research Institute

June 18, 1993

"Interstellar PAHs and Interstellar Dust"

Alexander Tielens; NASA, Ames

June 25, 1993

"Spectral Evolution of Galaxies in Clusters"

Stephane Charlot; LLNL and UC Berkeley

July 2, 1993

"Globular Clusters in the Milky Way: Utopia or Post-Holocaust"

Steve Murray; UC Berkeley and LLNL

July 9, 1993

"The Difference Between Globular Clusters and Elliptical Galaxies"

Michael Gregg; LLNL

July 16, 1993

"The Thermal Structure of Outflows from Young Stellar Objects"

Pedro Safier; UC Berkeley

July 23, 1993

"Toward a Generic Big Bang: A New Direction in Numerical Relativity"

Beverly Berger; Oakland University, MI

July 30, 1993

"Smooth Particle Hydrodynamics and Applications in Astrophysics"

Leigh Brookshaw; UC Davis

## Appendix B

---

- August 6, 1993  
"Gamma Rays from Galactic Black Holes"  
Edison Liang; Rice University, Houston, TX
- August 13, 1993  
"X-Ray-Heated Winds from Accretion Disks"  
Todd Woods; LLNL
- August 20, 1993  
"Geometrical Tests of Dark Matter in Clusters and Elliptical Galaxies from X-Ray Observations"  
Claude Canizares; Massachusetts Institute of Technology, Cambridge
- August 27, 1993  
"Supernova Mechanisms and Equations of State"  
Jerry Cooperstein; Oregon State University, Stillwater
- August 31, 1993  
"The Two Solar Neutrino Problems"  
Sidney Bludman; University of Pennsylvania, Philadelphia
- September 2, 1993  
"The Sequencing of Long and Short Outbursts in Dwarf Novae—Clues to the Physics of Accretion Disks"  
John Cannizzo; NASA, Goddard Space Flight Center, Greenbelt, MD
- September 3, 1993  
"Spectroscopy of Extragalactic Globular Clusters and Insights into Galaxy Formation"  
Jean Brodie; UC Santa Cruz
- September 10, 1993  
"Clusters of Galaxies and the Mean Density of the Universe"  
Douglas Richstone; University of Michigan, Ann Arbor
- September 24, 1993  
"Subject: NGC 3516"  
Anuradha Koratkar; Space Telescope Science Institute, Baltimore, MD
- October 8, 1993  
"Pulsars and Supernova Remnants"  
Shrinivas Ramchandra Kulkarni; California Institute of Technology
- October 15, 1993  
"Infall and Outflows in Early Stellar Evolution"  
Lee Hartman; Harvard-Smithsonian Center for Astrophysics, Cambridge, MA
- October 18, 1993  
"The Crust of the Neutron Star"  
Jochen Wambach; University of Illinois, Urbana
- October 19, 1993  
"Planetary Nebula Formation: Filling in the Missing Link"  
Margaret Meixner; UC Berkeley
- October 22, 1993  
"The True Shape of Elliptical Galaxies"  
Tom Statler; University of North Carolina, Chapel Hill
- October 29, 1993  
"Peculiar Motions in the Universe"  
Greg Bothun; University of Oregon, Eugene
- November 5, 1993  
"The Distance to M81 from the Hubble Space Telescope"  
Jeremy R. Mould; California Institute of Technology
- November 12, 1993  
"Probable Detection of Microlensing by Halo Objects: The MACHO Project's First Year"  
Kem Cook; LLNL
- November 18, 1993  
"Distant Radio Galaxies"  
Huub Rottgering; Leiden Observatory, The Netherlands
- November 19, 1993  
"Planetary Nebulae and Their Role in the Progress toward the Hubble Constant"  
George Jacoby; National Optical Astronomy Observatories, Kitt Peak Observatory, Tucson, AZ
- December 3, 1993  
"Making Mountains out of Mole Hills: Gas Dynamical Simulation of Galaxy and Large-Scale Structure Formation"  
Paul Shapiro; University of Texas at Austin
-

December 10, 1993

"The Structure of Spheroidal Nuclei as Seen with the Space Telescope"

Sandy Faber; UC Santa Cruz

January 7, 1994

"On Constraining the Small-Scale Structure of the Early Universe by Primordial Nucleosynthesis"

Karsten Jedamzik; LLNL

January 21, 1994

"COBE Observations and the Early Universe"

George Smoot; UC Berkeley

January 28, 1994

"Pixion Quantification of Picture Information Content with Application to Image Reconstruction"

Richard Puetter; UC San Diego

February 4, 1994

"Galaxy Evolution in Moderate Redshift Clusters"

Adam Stanford; Jet Propulsion Laboratory, Pasadena

February 11, 1994

"On Constraining the Small-Scale Structure of the Early Universe by Primordial Nucleosynthesis"

Karsten Jedamzik; LLNL

February 18, 1994

"The VLA FIRST Survey: A Progress Report"

Bob Becker; UC Davis and LLNL

February 25, 1994

"Relativistic Shocks and the Excitation of the Crab II Nebula"

Jonathan Arons; UC Berkeley

March 4, 1994

"Cosmic Microwave Background Anisotropies after COBE"

Douglas Scott; UC Berkeley

March 8, 1994

"Galaxy Dynamics and the Mass of the Universe"

Dr. Vera Rubin; Carnegie Institution of Washington

March 11, 1994

"Pluto's Atmosphere: Where it Comes From and Where it's Going"

Prof. Roger V. Yelle; University of Arizona, Tucson

March 18, 1994

"Evidence that Gamma-Ray Bursts Repeat and are Galactic in Origin"

Prof. Don Lamb; University of Chicago

March 21, 1994

"Testing Inflation"

Prof. Michael Turner; University of Chicago

April 1, 1994

"Inferring Cloud Fragmentation via Near Infrared Studies of a Young Star Cluster"

Mary Barsony; UC Riverside

April 8, 1994

"Gravitational Lensing, Time Delays, and Hubble's Constant"

Prof. Jacqueline Hewitt; Massachusetts Institute of Technology, Cambridge

April 15, 1994

"Nucleosynthesis in Massive Stars"

Dr. Tom Weaver; LLNL

April 18, 1994

"White Dwarfs and Brown Dwarfs Theory: Galactic Implications"

Gilles Chabrier; Ecole Normale Supérieure De Lyon, Cedex, France

April 18, 1994

"The Shape of Dark Matter Halos: Another Conspiracy"

Penny Sackett; Institute for Advanced Study, Princeton, NJ

April 22, 1994

"Galileo Enroute to Jupiter"

Dr. Torrence Johnson; Jet Propulsion Laboratory, Pasadena

April 29, 1994

"IR to X-Ray Spectral Energy Distributions of High Redshift Quasars"

Prof. Jill Bechtold; University of Arizona, Tucson

## Appendix B

---

May 2, 1994

"Infall to the Galactic Center"

Paul Ho; Smithsonian Astrophysical Observatory,  
Cambridge, MA

May 4, 1994

"Spectral Characteristics of Local Galaxies"

Ann Kinney; Space Telescope Science Institute,  
Baltimore, MD

May 6, 1994

"Galactic Accretion Disks: Listing the Veil on Halos"

Tom Steiman-Cameron; NASA, Ames

May 10, 1994

"Science with the Infrared Array Spectrometer CGS4 on  
the United Kingdom Infrared Telescope—From the Solar  
System to the Edge of the Universe"

Gillian Wright; United Kingdom Infrared Telescope

May 13, 1994

"Batch Discovery of Six High-Redshift Supernovae:  
Developing a New Tool for Cosmology"

Dr. Saul Perlmutter; Lawrence Berkeley Laboratory

May 17, 1994

"UCLA Infrared Camera and an Infrared Search for  
Brown Dwarfs in the Hyades"

Bruce Macintosh; UC Los Angeles

May 20, 1994

"Measuring the Extragalactic Distance Scale with Type II  
Supernovae"

Ron Eastman; LLNL

May 27, 1994

"Mining the MACHO Database: Microlensing and  
Variable Stars"

Kem Cook; LLNL

August 12, 1994

"Multi-Wavelength Signatures of Galactic Black Holes"

Prof. Edison Liang; Rice University, Houston, TX,  
and LLNL

September 9, 1994

"The Propagation of MHD-Waves in Plasma with Random  
Inhomogeneities"

Margarita P. Ryutova; Institute of Nuclear Physics,  
Novosibirsk, Russia

September 16, 1994

"Results from the ASCA X-Ray Observatory"

Dr. Nick White; NASA, Goddard Space Flight Center,  
Greenbelt, MD

September 22, 1994

"Three-Dimensional Local Instability in Accretion Disks"

Tzi-Hong Chiueh; National Central University, Taiwan

September 23, 1994

"Cosmic Gamma Ray Bursts and Soft Gamma Ray  
Repeaters"

Dr. Kevin Hurley; UC Berkeley

September 29, 1994

"Gamma Ray Bursts from Fast Neutron Stars in the  
Galactic Halo"

Stirling Colgate; Los Alamos National Laboratory, NM

September 30, 1994

"Galaxy Formation and Globular Clusters"

Dr. Steve Zepf; UC Berkeley

October 7, 1994

"Relativistic Binary Neutron Star Coalescence"

Grant Mathews; LLNL

October 14, 1994

"The Great Crash of Comet Shoemaker-Levy 9  
with Jupiter"

Imke de Pater; UC Berkeley

October 21, 1994

"Results from the Calan/Tololo Supernova Survey: The  
Observational Diversity of Type Ia Events"

Dr. Nicholas B. Suntzeff; Cerro Tololo Inter-American  
Observatory

October 28, 1994

"Theory and High-Energy Observations of Be-Star/Pulsar  
System PSR 1259-63"

Marco Tavani; Columbia University, NY

November 4, 1994  
"Ionization and Abundances of Intergalactic Gas"  
David R. Tytler; UC San Diego

November 10, 1994  
"Recent Problems in Nuclear Astrophysics"  
Karl-Heinz Langanke; California Institute of Technology

November 11, 1994  
"Gamma Ray Burst Optical Counterparts Search Experiment (GROCSE)"  
Hye-Sook Park; LLNL

November 18, 1994  
"The Vela Remnants Observed with HST: Evidence of Shock Compression and R-Process Elements"  
Dr. George Wallerstein; UC Berkeley

December 2, 1994  
"The Frequency and Effect of T Tauri Companion Stars"  
Andrea Gehz; UC Los Angeles

December 7, 1994  
"Dusty Quasars"  
Michael Drinkwater; Anglo-Australian Observatory

December 9, 1994  
"Gamma Ray Pulsars"  
Roger Romani; Stanford University

December 12, 1994  
"Equation of State of Molten Basalt and its Implications for Magma Dynamics"  
Linda Rowan; Johnson Space Center, Houston, TX

December 15, 1994  
"Radio-Emitting X-Ray Bullet Ejected by the Vela Supernova"  
Richard Strom; UC Berkeley

December 16, 1994  
"New Approaches to Radiation Transport Theory"  
Prof. Mamikon A. Mnatsakanian; UC Davis

January 17, 1995  
"Gamma Ray Bursts and Cosmology"  
Dr. Nemiroff; NASA, Goddard Space Flight Center, Greenbelt, MD

January 20, 1995  
"Extreme Ultraviolet Observations of Accreting White Dwarfs"  
Chris Mauche; LLNL

January 27, 1995  
"Black Holes in 2+1 Dimensions"  
Alan Steif; UC Davis

February 3, 1995  
"Pseudomoment Stellar Dynamics: Shape of the Galactic Dark Halo"  
Peter Amendt; LLNL

February 10, 1995  
"The Future of Cosmic X-Ray Spectroscopy"  
Simon Labov; LLNL

February 17, 1995  
"GLAST: A Next Generation Gamma Ray Space Telescope"  
Bill Atwood; Stanford Linear Accelerator Center

March 10, 1995  
"South Pole Experiments"  
Jeff Peterson; Carnegie Melon University

March 17, 1995  
"Double-Mode Cepheids in the Magellanic Clouds: Results from the MACHO Project"  
Prof. Doug Welch; McMaster University, Ontario, Canada

March 24, 1995  
"Rings of Fire: Thermonuclear Combustion of Accreted Fuel on Neutron Stars"  
Prof. Lars Bildsten; UC Berkeley

March 31, 1995  
"Extragalactic Eclipsing Binaries: Astrophysical Laboratories and Cosmic Scale Distance Indicators"  
Prof. Edward Guinan; Villanova University, Pennsylvania

April 7, 1995  
"The Millimeter Wave Anisotropy Experiment (MAX)"  
Prof. Paul L. Richards; UC Berkeley

## Appendix B

---

- April 14, 1995  
"Adaptive Optics and Laser Guide Stars for Astronomy"  
Dr. Claire Max; LLNL
- April 21, 1995  
"Starburst Galaxies and Superwinds"  
Dr. Mat Lehnert; LLNL
- April 28, 1995  
"The CDMS Experiment: A Search for WIMPs Using Novel Cryogenic Detectors"  
Dr. Thom Shutt; UC Berkeley
- May 1, 1995  
"Science Information Infrastructure and Science On-Line: A Mechanism for Bringing Cutting Edge Research into the K-12 Classroom"  
Dr. Isabel Hawkins; UC Berkeley
- May 19, 1995  
"A Large-Scale Dark-Matter Axion Search"  
Dr. Karl Van Bibber; LLNL
- May 26, 1995  
"Microlensing and Halo Cold Dark Matter"  
Prof. Michael Turner; University of Chicago and NASA, FNAL Astrophysics Institute
- June 2, 1995  
"Numerical Investigation of Generic Big Bangs"  
Prof. Beverly Berger; Oakland University, MI
- June 9, 1995  
"Photon Bubble Instability and Accreting Neutron Stars"  
Dr. Julianna Hsu; LLNL
- June 16, 1995  
"New Results on Low-Mass Star Theory: Implication for the Missing Mass in the Galaxy"  
Dr. Giles Chabrier; Ecole Normale Supérieure, Lyon, France
- June 23, 1995  
"Looking for the Highest Energy Gamma-Rays and Cosmic Rays"  
Prof. Carl Akerlof; University of Michigan, Ann Arbor
- June 30, 1995  
"Group Properties of the Generalized Stokes Intensities for Multi-Element Standing Waves in a Cavity"  
Dr. Larry November; National Optical Astronomy Observatories, Tucson, AZ
- July 28, 1995  
"Observation of Gamma-Ray Bursts by BATSE on the Compton Observatory"  
Dr. Gerald J. Fishman; NASA, Marshall Space Flight Center, Huntsville, AL
- August 11, 1995  
"Relativistic Numerical Model for Binary Neutron Star Coalescence"  
Dr. James R. Wilson; LLNL
- August 25, 1995  
"Big Bang Nucleosynthesis in Crisis"  
Prof. Sidney Bludman; University of Pennsylvania, Philadelphia
- October 27, 1995  
"The Quest For Accretion Disks in Active Galaxies"  
Michael Eracleous; UC Berkeley
- November 3, 1995  
"From Fast Pulsars to Strange Dwarfs"  
Fridolin Weber; Lawrence Berkeley Laboratory
- November 10, 1995  
"First Results from the VLA FIRST Survey"  
Robert Becker; UC Davis and LLNL
- November 17, 1995  
"The Centers of Globular Clusters as Seen by Hubble Space Telescope's WFPC2"  
Raja Guhathakurta; UC Santa Cruz
- December 1, 1995  
"Recent Theoretical and Observational Advances in the Study of Brown Dwarfs and Extra-Solar Giant Planets"  
Adam Burrows; University of Arizona, Tucson
- December 8, 1995  
"Structure and Dynamics in the Central Sub-Parsec Region of the Galaxy NGC 4258"  
Dr. Eyal Maoz; UC Berkeley
- December 15, 1995  
"Population Synthesis with a Library of Elliptical Galaxies"  
Michael Gregg; LLNL
-

## **Workshops**

January 3-4, 1991

Nuclear Physics and Astrophysics Workshop  
in honor of Stewart Bloom

"Strong, Weak, and Electromagnetic Interactions  
in Nuclei and Astrophysics"

Sponsored by IGPP; held at IGPP-LLNL

July 27, 1991

Nucleosynthesis and Isotopic Anomalies Workshop  
Held at IGPP-LLNL

March 24, 1992

Geodesy Workshop

Hosted by John Rundle; held at IGPP-LLNL

March 17-19, 1994

Galactic Chemical Dynamics Workshop

Hosted by Grant Mathews; held at IGPP-LLNL

January 13-15, 1995

Microlensing Workshop

Hosted by IGPP-LLNL

## *Appendix B*

---



## Seminars

January 23, 1990

"Cenozoic Plate Tectonics of the Northeastern Pacific and Western North America: New Developments"

Tanya Atwater; UC Santa Barbara

February 1, 1990

"Microscale Chemical Heterogeneity of Groundwater"

Mordecai Margaritz; California Institute of Technology

February 8, 1990

"Hydrodynamic Interaction in Colloidal Dispersions and Porous Media, Via Lattice-Gas Models of the Fluid Phase"

Tony Ladd; LLNL

February 15, 1990

"A Simple and Convenient Isotropic Failure Surface"

M. B. Rubin; LLNL

April 5, 1990

"Rupture Nucleation on Unfavorably Oriented Faults"

Richard Sibson; UC Santa Barbara

May 3, 1990

"Episodic Yoyo Movements (Epirogeny) on Continental Platform and Intra-Cratonic Basins: Need for Reinterpretation of Paleogeography, Faunal Extinctions, and Source Rock Maturity"

Gerald M. Friedman; Rensselaer Center of Applied Geology

May 17, 1990

"Solution-Mineral Equilibria in Icelandic Geothermal Systems"

Stevan Arnorsson; University of Iceland and Stanford University

May 23, 1990

"Nontraditional Petroleum Reservoir Mechanisms"

Michael Prats; University of Texas at Austin

May 24, 1990

"Chemical and Biological Degradation of Halogenated Solvents"

Timothy Vogel; University of Michigan, Ann Arbor

July 18, 1990

"Regional Modeling of Groundwater Flow in Fractured Rock Aquifers: Discrete Flow Modeling with Analytic Elements"

Stephen R. Kraemer; University of Virginia, Charlottesville

July 26, 1990

"Behavior of Radionuclides at the Chernobyl Incident"

Igor L. Khodakovskiy; Vernadskiy Institute of Geochemistry, USSR Academy of Sciences, Moscow, USSR

September 4, 1990

"Electromagnetic Exploration of the Earth's Crust"

Gerhard Schwarz; Freie Universität Berlin, West Germany

November 7, 1990

"Crust-Mantle Evolution in the Archean"

P. Jonathan Patchett; University of Arizona, Tucson

December 13, 1990

"In Situ and On-Site Bioremediation of Contaminated Leachates and Soils"

Robert L. Irvine; University of Notre Dame, IN

January 17, 1991

"Accommodation Mechanisms for the Indo-Asian Collision: Crustal Thickening vs Tectonic Escape"

T. Mark Harrison; UC Los Angeles

January 18, 1991

"Fluid Crustal Layer and Implications for Continental Dynamics"

Brian Wernicke; Harvard University, Cambridge, MA

## Appendix B

---

January 24, 1991

"Aspects of the Structural Evolution of the NTS Region"

Richard A. Schweikert; University of Nevada, Reno

January 30, 1991

"Oxygen Diffusion in Oxides and Silicates: Implications for Meteorite Thermal Histories"

Frederick J. Ryerson; LLNL

February 13, 1991

"Frictional Properties of Simulated Fault Gouge and Implications of Fault Stability and Earthquake Afterslip"

Chris J. Marone; UC Berkeley

February 15, 1991

"Dynamic Response of Earth Materials"

Thomas J. Ahrens; California Institute of Technology

February 27, 1991

"Plio-Pleistocene Climate: Global Ice Sheets and Deep Ocean Circulation"

Maureen Raymo; UC Berkeley

March 6, 1991

"Mantle Phase Transitions and Associated Faulting: A Unified Hypothesis of Deep Earthquakes"

Stephen H. Kirby; U.S. Geological Survey, Menlo Park

March 21, 1991

"Barium: A New Tracer for Ocean on Climate Change"

David Lea; UC Santa Barbara

March 28, 1991

"Fluid Crustal Layer and Implications for Continental Dynamics"

Brian Wernicke; Harvard University, Cambridge, MA

April 17, 1991

"Recent Developments in Time-Space Continuum Models of Fluid/Rock Reaction"

Peter Lichtner; Universitaet Bern, Switzerland

April 25, 1991

"Barbados Sea Level Records 0–20 Thousand Years: Monitoring Amplifiers of Global Climate Change"

Richard Fairbanks; Lamont-Doherty Geological Observatory, Columbia University, NY

May 3, 1991

"Hydrological Signatures of Earthquake Strain"

Robert Muir Wood; Engineer, Safety, and Management Consultants, Cambridge, England

May 23, 1991

"Creep Behavior of Alkali Halide Solid Solutions"

Jeffrey B. Wolfenstine; UC Irvine

May 24, 1991

"The Effects of Organic Acids on Clastic Diagenesis: Experimental Studies and Thermodynamic Models"

Jeff Thyne; Colorado School of Mines, Golden

June 5, 1991

"Seismic Properties of the Granulite-Eclogite Transition Based on a Field Example"

David Fountain; University of Wyoming, Laramie

June 7, 1991

"Granites as Probes of Crustal Evolution"

Calvin Miller; Vanderbilt University, Nashville, TN

June 12, 1991

"Fractal in Geology and Paleontology"

Roy E. Plotnick; University of Illinois, Chicago

June 20, 1991

"Nonlinear Seismology"

Igor Beresnev; Institute of Physics of the Earth, Academy of Sciences, Moscow

June 25, 1991

"Application of the Coda Method of the Separation of Source, Site, and Path Effects—An Overview of Recent Findings from Central California, Long Valley, and Hawaii"

Kevin M. Mayeda; University of Southern California, Los Angeles

July 16, 1991

"Large Meteorite Impacts and Atmospheres: Application to the K/T Event and to Venus"

Jay Melosh; University of Arizona, Tucson

July 19, 1991

"The Vredefort Bronzite Granophyre, South Africa: Chemical Evidence"

Bevan French; NASA, Solar System Exploration Division, Houston, TX

July 24, 1991

"Do Schallamach-Comninou Waves Explain the San Andreas Heat Flow Paradox?"

James N. Brune; University of Nevada, Reno

October 7, 1991

"Phenomenological Approach to Unsaturated Flow of Non-Newtonian Solutions in Soils and Porous Media"

John Philip; CSIRO Centre for Environmental Mechanics, Australia

October 14, 1991

"Applications of Shallow Seismic Reflection to Environmental and Engineering Problems"

Donald Steeples; Kansas Geological Survey, Lawrence

November 8, 1991

"Permeability of Sandstones from Image Processing"

Stephen Blaire; LLNL

November 21, 1991

"An Inversion of Seismic Refraction-Line First Arrival Times"

Chuck Ammon; UC Santa Cruz

November 21, 1991

"Inversion Strategies at a Geologically Complex Plate Boundary: Characterizing Fault Slip in Southern California from Geodetic Data"

Hadley Johnson; Scripps Institute of Oceanography, UC San Diego

December 6, 1991

"A Geochemical Transport Model for Redox-Controlled Movement of Mineral Fronts in Groundwater Flow Systems: Denitrification of Oxidation of Pyrite"

Ken Kipp; U.S. Geological Survey, Denver, CO

December 16, 1991

"NMR Investigations of the Interaction of Water with Minerals and Glasses"

R. James Kirkpatrick; University of Illinois, Urbana

December 16, 1991

"Neutral Buoyancy Magma Transport in Volcanic Rift Zones"

Mike Ryan; U.S. Geological Survey, Reston, VA

December 16, 1991

"The Path of the Pole During Geomagnetic Reversals"

Stanley Runcorn; University of Alaska

December 17, 1991

"Seismic Velocities in Compacting Sediments"

Jack Dvorkin; Stanford University

February 14, 1992

"Liquid Fuels in the 21st Century: A Nuclear Option"

Donald Towse; LLNL

February 25, 1992

"Two Topics in Fault Dynamics: Experimental Observations of Interface Separation Waves During Stick Slip and a Cellular Automation Model of Earthquakes"

Stephen R. Brown; Sandia National Laboratories, Albuquerque, NM

March 11, 1992

"Petrologic Applications of Single and Double Medium Diffusion Modeling"

Herb Want; University of Wisconsin, Madison

March 23, 1992

"Katmai Scientific Drilling Project: Results and Outlook"

John Eichelberger; University of Alaska

April 8, 1992

"Effects of Defects on Electrical Properties of Olivine"

Barbara J. Wanamaker; University of Minnesota, Minneapolis

April 28, 1992

"A Fractal Analysis of Sea-Level Changes—Implications for Global Change"

Albert T. Hsui; University of Illinois, Urbana

May 1, 1992

"North Sea Clastic Diagenesis and Formation Water Constraints"

Per Agaard; University of Oslo, Norway

## Appendix B

---

July 8, 1992

"Experimental Deformation of a Quartz Mylonite:  
The Influence of Chemical Environment, or Wet About  
the Ears with Quartz Deformation"

James N. Boland; Division of Geomechanics, CSIRO,  
Australia

August 10, 1992

"Radionuclides Migration at MAYAK in Russia"

Igor Khodakovsky; Russian Academy of Sciences,  
Moscow

August 12, 1992

"Modeling Compaction and Dilation of Porous Rocks"

Miles Rubin; Technion-Israel Institute of Technology

September 24, 1992

"Deformation During a Solid-State Phase Transformation  
and the Influence of an Externally Applied Axial Stress—  
Geophysical and Technological Implications"

Alex McLaren; Australian National University, Canberra

November 3, 1992

"Fractals in Geology and Geophysics"

Don Turcotte; Cornell University, Ithaca, NY

November 5, 1992

"Hydrothermal Systems Associated with Stratovolcanoes"

Bob Criss; UC Davis

December 4, 1992

"What's New at CHiPR?"

Alexandra Navrotsky; Princeton University, NJ

January 27, 1993

"Seismic Gaps"

David Jackson; UC Los Angeles

March 4, 1993

"Experimental Constraints on Subduction Zone  
Metasomatism"

Craig Manning; UC Los Angeles

May 6, 1993

"D/H Ratios of Hydrous Phases in SNC Meteorites:  
Implications for H<sub>2</sub>O on Mars"

Laurie Watson; California Institute of Technology

May 11, 1993

"Ridge Forces, Absolute Plate Motions, and the Intraplate  
Stress Field"

George Zandt; LLNL

July 29, 1993

"Magma Mixing Revisited"

Charles Leshner; UC Davis

September 23, 1993

"Constraining Molecular Models of Ion Sorption  
Spectroscopy"

Peggy O'Day; UC Berkeley

December 9, 1993

"Measurement of Anisotropic Elastic Moduli and  
Comparison with Equivalent Media Theories"

Julie Hood; University of Miami, Florida

December 16, 1993

"PIXE and Related Techniques Applied to the  
Geosciences"

Graham Bench; GERP's Center for Accelerator Mass  
Spectrometry

January 20, 1994

"Proving Phase Transformations in NaCl and Tridymite  
via Infrared Spectrometry at Pressure and Temperature"

Anne Hofmeister; UC Davis

February 17, 1994

"Phase Equilibria Studies of Amphibolite-Eclogite  
Transition"

Jun Liu; Stanford University

March 1, 1994

"Crustal Thickening and Lithospheric Thinning in the  
Indo-Asian Continental Collision"

Greg Houseman; Monash University, Australia

March 3, 1994

"Subducted Oceanic Sediments—Experimental  
Constraints on Highly Peraluminous Melts and  
Cl-Rich Fluids"

Geoff Nichols; California Institute of Technology

March 28, 1994

"Origin of the Giant Stratospheric SO<sub>2</sub> Cloud from the Climactic Eruption of Mount Pinatubo"

Terry Gerlach

March 30, 1994

"Rates of Silicate-Water Interactions in Natural Processes"

Eric Oelkers; University of Paul Sabatier, Toulouse, France

April 29, 1994

"Systematic Stress Variations in the Southern San Joaquin Valley and Along the White Wolf Fault: Implications for the Rupture Mechanics of the 1952 Ms 7.8 Kern County Earthquake and Contemporary Seismicity"

David Castillo; Stanford University

May 5, 1994

"Ore Mineralization in the German Deep Drilling Project and its Significance to some Geophysical Parameters"

Agnes Kontny; University of Greissen, Germany

May 12, 1994

"History, Experience, and Possibilities of Interpretation of Magnetotelluric Measurements in the Eastern Part of Germany"

G. Porstendorfer; Bergakademie Freiberg, Institute of Geophysics, Freiberg, Germany

May 16, 1994

"Analysis of the Geochemical Aspects of the Underground Disposal of CO<sub>2</sub>"

Isabelle Czernichowski; Bureau de Recherches Geologiques de Minieres

June 2, 1994

"Perspectives of Mantle Melting from Thermodynamic Models of Minerals and Silicate Melts"

Marc Hirschmann; California Institute of Technology

June 1994

"Water Transport and Release in Subduction Zones: An Experimental Investigation of Hydrous Phases in Synthetic and Natural (Crustal) Systems"

Clermont Ferrand; Department de la Terre, CNRS, France

November 3, 1994

"Water, Water Everywhere, Not a Drop to Drink: Health Implications and Treatment Options for Arsenic in Drinking Water"

Dr. Janet Hering; UC Los Angeles

November 21, 1994

"High Resolution Windows into Past Climate: The Coral Record"

Dr. Malcolm McCullock; Australian National University, Canberra

December 1, 1994

"REE Mobility in Crustal Fluids"

Dr. K. Vala Ragnarsdottir; Department of Geology, University of Bristol

December 2, 1994

"Phase Relations of FeO and ReS at High Pressure"

Dr. Yingwei Fei; Carnegie Institute of Washington, Geophysical Laboratory

December 2, 1994

"Crystal Chemistry of Iron in Mantle Phases"

Dr. Catherine McCammon; Bayerisches Geoinstitute, Universtat Bayreuth

December 6, 1994

"Current Synroc Research at ANSTO"

Dr. Katherine L. Smith; Australian Nuclear Science and Technology Organization (ANSTO)

December 9, 1994

"Successful In-Situ Bioremediation at the Chico Municipal Airport"

Dr. Ken Jackson; LLNL

December 12, 1994

"Geochemical and Geophysical Results from the German Deep Drilling Project"

Dr. Johasses Stoll and Juergen Bigalke; University of Frankfurt, Germany

January 4, 1995

"Mechanisms of Shallow Magmatic Differentiation"

Dr. Alexander R. McBirney; Center for Volcanology, University of Oregon, Eugene

## Appendix B

---

February 27, 1995

"Transformation of Aromatic Amines in Sediments Amended with Hydrogen Peroxide: Reaction Pathways"  
Dr. Leah Matheson; Environmental Protection Agency Laboratory, Athens, GA

February 23, 1995

"Remediation of Organic Contaminants with Iron Metal: Processes Affecting Remediation Performance"  
Dr. Paul G. Tratnyek; Department of Environmental Sciences and Engineering, Oregon Graduate Institute

February 23, 1995

"Application of U/Th Series Disequilibrium Concepts to Rock/Water Interaction Modeling"  
Dr. Miro Ivanovich; Analytical Services, United Kingdom

February 28, 1995

"What Makes a Hot Spot Swell"  
Dr. Jason P. Morgan; Scripps Institute of Oceanography, UC San Diego

March 9, 1995

"The Bonanza Arc, Vancouver Island, Canada: A Window into the Deep Crust of an Island Arc"  
Dr. Susan Dabari; Geology Department, San Jose State University

March 31, 1995

"Massive Ignimbrites, Huge Calderas, Monstrous Lava Flows: The Products of Silicic Magmatism in the Central Andes"  
Dr. Shanaka L. de Silva; Department of Geography and Geology, Indiana State University, Bloomington

April 12, 1995

"Fluid Inclusion Systematics of Geothermal Systems"  
Dr. Joseph Moore; University of Utah

April 18, 1995

"Evaluation of a Genetically Engineered Model Organism for In-Situ Bioremediation"  
Rainer Erb; German National Center for Biotechnology

April 25, 1995

"Trace Element Partitioning Between Amphibole, Phlogopite, and Basanite Melt"  
Dr. Thomas LaTourrette; Division of Geological and Planetary Sciences, California Institute of Technology

May 3, 1995

"Laboratory and Field Investigations of Remediation of PCP in Soil"  
Dr. Ulrich Larsson; National Environmental Institute of Denmark

May 3, 1995

"The White Island, New Zealand Scientific Drilling Project"  
Dr. Wilfred A. Elders; Department of Earth Sciences, UC Riverside

May 30, 1995

"Metabolic Tolls for Generating Biocatalysts to Degrade Aromatic Pollutants"  
Dr. Victor de Lorenzo; CSIC Institute, Madrid

June 8, 1995

"Physics Appreciation: A College Course for Non-Science Majors"  
Dr. John White; LLNL

June 12, 1995

"Rapid Association of Regional Network Phases"  
Dr. Carl Johnson; Geology Department, University of Hawaii

June 27, 1995

"Spatiotemporal Patterns in the Energy Release of Great Earthquakes"  
Dr. Barbara Romanowicz; Geology and Geophysics Department, UC Berkeley

July 14, 1995

"Development of Biosorption Technology for Treatment of Uranium Contaminated Wastewater Ex-Situ"  
Dr. Brandlyn D. Faison; Chemical Technology Division, Oak Ridge National Laboratory, TN

July 21, 1995

"Quartz Reactivity: Controls of Solvent-Surface Interactions During Dissolution and Tensile Fracture Processes"  
Dr. Patricia Dove; School of Earth and Atmospheric Sciences

## **Workshops**

May 2-4, 1990

The 84th Annual Meeting of the Seismological  
Society of America; Santa Cruz, California;  
cosponsored by IGPP-LLNL and UC Santa Cruz

July 21-26, 1991

54th Annual Meeting of the Meteorological Society  
in Monterey, CA





## Seminars

January 4, 1990

"Current Issues in Static High Pressure"

Sergei Stishov; Institute of Crystallography, Moscow,  
and California Institute of Technology

January 5, 1990

"Pressure and Magnetic Studies of Electron Doped  
CuO Superconductors"

John Markert; UC San Diego

January 25, 1990

"Polarized Targets for Hydrogen Fusion"

Clark Souers; LLNL

February 1, 1990

"Predicting Properties of Solids, Clusters, and  
Superconductors"

Marvin Cohen; UC Berkeley

March 29, 1990

"Shock Compression of Solids: A Tutorial"

William Nellis; LLNL

March 30, 1990

"Recent Transport Measurements in High- $T_c$  Super-  
conducting Oxides"

Alex Zettl, UC Berkeley

April 5, 1990

"Chemical Equilibrium? Models of Transient States:  
Foams and Carbon"

Mat van Thiel; LLNL

April 26, 1990

"Strong Correlation in the Cuprates"

Andy McMahan; LLNL

May 18, 1990

"Phase Behavior of Binary Mixtures at High Pressure:  
Experiments and Theoretical Calculations"

Willem L. Vos; Universiteit van Amsterdam

May 31, 1990

"Studies of High Temperature Superconductors and  
High Pressure Hydrogen"

Troy Barbee III; UC Berkeley

June 18, 1990

"Optical Properties of High-Pressure Nonideal Plasmas"

Vladimir Fortov; High Temperature Institute, Moscow

June 18, 1990

"Computer Simulations of Detonation Phenomena"

Tatiano Fortova; Institute of Chemical Physics,  
Chernogolovka, USSR

June 19, 1990

"Non-Additive Interactions in Simple Molecular Crystals  
and Interaction of Picosecond Laser Pulses with Metals"

Sergey Anisimov; Landau Institute of Theoretical Physics,  
Moscow, USSR

June 28, 1990

"Liquid Carbon"

Richard M. Martin; University of Illinois, Urbana

July 2, 1990

"Plasmas Produced by the Shock Compression of Gases"

G. I. Mishin; Ioffe Physical-Technical Institute,  
Leningrad, USSR

July 2, 1990

"Theory at High Temperature Superconductivity"

Alexei A. Abrikosov; Institute of High Pressure Physics,  
Moscow, USSR

July 3, 1990

"Recent Results in Static High-Pressure Research"

S. M. Stishov; Institute of Crystallography,  
Moscow, USSR

## Appendix B

---

July 11, 1990

"Hot Forging: A New Method to Densify SHS-Produced TiC"

Lothar W. Meyer; Franhofer Institute for Applied Research of Materials, West Germany

October 4, 1990

"The Effect of Intercalation of Lithium in InSe"

Pedro Gomes da Costa; UC Irvine

October 18, 1990

"Electronic Structure of Materials Using Nonlinear Optimization Methods"

Lin H. Yang; Argonne National Laboratory, IL

October 24, 1990

"Pinning of Flux Vortices in High-Temperature Superconductors"

Michael McElfresh; Purdue University, West Lafayette, IN

October 25, 1990

"Molecular Dynamics Modeling Applied to Surface Indentation and Metal Cutting"

James Belak; LLNL

October 26, 1990

"Shock Waves as a Technique for High Temperatures and New Materials"

A. B. Sawaoka; Tokyo Institute of Technology, Japan

October 29, 1990

"Recent Structural and Optical Studies to Static Pressures of 4 Megabars"

Yogesh K. Vohra; Cornell University, Ithaca, NY

November 1, 1990

"Ab Initio Studies Including Relativistic Effects on Atoms, Molecules, and Clusters"

Richard B. Ross; Ohio State University, Columbus

November 6, 1990

"Shock Compression of Ultra-Low-Density Solids"

Neil Holmes; LLNL

November 8, 1990

Work in Progress

David Erskine, "Shock-Induced Transformation of Graphite to Diamond"

John Klepeis, "Electronic and Atomic Structure of Low Metal Coverages on Gallium Arsenide (110)"

November 12, 1990

National Academy of Sciences Lecture Series:

"The High-Pressure Diamond Cell: A Window on Earth and Planetary Interiors"

H.-K. Mao; Carnegie Institution of Washington

November 15, 1990

"Electronic Structure of Pa Cl-26; the 6d-5f Fluorescence Spectrum"

Norman M. Edelstein; Lawrence Berkeley Laboratory

November 29, 1990

"Electrical Conductivity of Dunite"

Steve Constable; UC San Diego

November 29, 1990

Work in Progress

Christian Mailhot, "Transport of Electron through Semiconductor Interfaces," and "Metastable Phases of Carbon"

December 3, 1990

"Effects of Explosive Loading of a Contained Liquid"

Valerie Kedrinski; Institute of Hydrodynamics, Novosibirsk, Commonwealth of Independent States

December 3, 1990

"Shock Deformation of Single-Crystal Quartz with Initial Temperatures -170 to 1000°C"

Andrew Gratz; Pennsylvania State University, University Park

December 6, 1990

"Physical Chemistry of Semiconductor Nanocrystals"

Paul Alivisatos; UC Berkeley

December 13, 1990

"Electrical Conductivity of Olivine ( $\text{Mg}_{1.8}\text{Fe}_{0.2}\text{SiO}_4$ ) and the Oceanic Upper Mantle"

Steven Constable; UC San Diego

December 17, 1990

“Experimental Investigations on the SOLOL Facility”  
Vladimir Kryuchenkov; All-Union Research Institute  
of Technical Physics, Chelyabinsk, Commonwealth  
of Independent States

December 18, 1990

“Reactor-Pumped Lasers”  
Edward Magna; All-Union Research Institute of  
Technical Physics, Chelyabinsk, Commonwealth  
of Independent States

January 10, 1991

“Structural and Optical Properties of Variable Band-  
gap Crystalline and Amorphous Semiconductors of  
Tetrahedral Coordination”  
Susanne M. Lee; Harvard University, Cambridge, MA

January 24, 1991

“High-Pressure Studies of Lanthanides and Actinides”  
Jagan Akella; LLNL

January 25, 1991

“Structure of Silica Glass at High Pressure”  
Mark Bukowski; UC Berkeley

January 31, 1991

“Water-Nitrogen Super-Critical Phase Separation”  
Marc Constantino; LLNL

February 5, 1991

“3D Modeling of Convection in the Mantles of  
the Terrestrial Planets and in the Interiors of the  
Giant Planets”  
Gary Glatzmaier; Los Alamos National Laboratory, NM

February 7, 1991

“Quasiparticle Properties of Semiconductors and  
Insulators”  
Michael P. Surh; UC Berkeley

February 14, 1991

“High-Pressure Studies of Lanthanides and Actinides”  
Jagan Akella; LLNL

February 15, 1991

“Dynamic Response of Earth Materials”  
Thomas J. Ahrens; California Institute of Technology

February 20, 1991

“From Superconducting Oxygen to Magnetic Hydrogen:  
An Alternative View of Metals”  
Jorge Hirsch; UC San Diego

February 21, 1991

“Growth and Characterization of  $\text{YBa}_2\text{Cu}_3\text{O}_{7-x}$   
Thin Films”  
Jorge A. Kittl; California Institute of Technology,

March 6, 1991

“Steady Shock Transitions which are Shaped by  
Viscosity, Heat Conduction, Chemical Reactions,  
and an Idealized External Source”  
Jonathan Mace; Washington State University, Pullman

March 6, 1991

“Mantle Phase Transitions and Associated Faulting:  
A Unified Hypothesis of Deep Earthquakes”  
Steve Kirby; U.S. Geological Survey, Menlo Park

March 15, 1991

“Equations of State of Hydrogen-Helium and the  
Structures of the Giant Planets”  
Didier Saumon; University of Arizona, Tucson

April 3, 1991

“Hugoniot Wave Profile and Equation-of-State  
Measurements Relating to the Earth’s Interior”  
Thomas Duffy; California Institute of Technology

May 7, 1991

“Activities of Ceracon Company in Advanced Ceramics  
and Metals”  
Ramas Raman; Ceracon Company, Sacramento, CA

October 17, 1991

“Structure–Property Relationships in Organic Aerogels”  
Richard W. Pekala; LLNL

November 19, 1991

“Raman Studies of  $\text{C}_{60}$  at High Pressures and Low  
Temperatures”  
Sarah Tolbert; UC Berkeley

## Appendix B

---

November 21, 1991

"Quantum Monte Carlo Studies of Hydrogen and Helium"

Karl Runge; LLNL

November 22, 1991

"Synthesis and Processing of Ceramic Materials"

Joanna McKittrick; UC San Diego

December 9, 1991

"Hydrothermal Studies in the Diamond Anvil Cell: The Equation of State of Water"

William B. Bassett; Cornell University, Ithaca, NY

December 12, 1991

"Fractured Statistics: Theory vs Experiment"

Robert Laughlin; LLNL

December 13, 1991

"Experimental Constraints on the Metallization of Hydrogen"

Russ Hemley; Carnegie Institute of Washington, Geophysical Library

December 17, 1991

"Optical Measurements of Simple Systems at High Pressures: Hydrogen and Argon"

Hector Lorenzana; UC Berkeley

January 16, 1992

"Three-Dimensional Analog of Anions and Superconductivity"

Stephen B. Libby; LLNL

January 31, 1992

"Formation of Tektites by Multiple Impacts"

John Wasson; UC Los Angeles

February 7, 1992

"Pressure-Induced Amorphization"

Ray Jeanloz; UC Berkeley

February 13, 1992

"Phase Relations in the Diamond Anvil Cell"

Malcolm Nicol; UC Los Angeles

February 20, 1992

"Surface Structure Determination Using Photoelectron Holography"

Lou J. Terminello; LLNL

February 27, 1992

"Phase Transformations in Perovskite Viewed in the TEM Plus Anisotropic Convection in the Upper Mantel"

Hans-Rudolf Wen; UC Berkeley

March 3, 1992

"Shock Deformation and Transformation of Sapphire"

David Howitt; UC Davis

March 6, 1992

"In Situ Observations of Microstructures During Shock Loading"

Alan Frank; LLNL

March 12, 1992

"Nonclassical Nucleation in Fluid to Solid Phase Transitions"

William Klein; Boston University, MA

March 27, 1992

"Theory of STM from Clean and Adsorbate-Covered Metal Surfaces"

Dejana Drakova; University of Sofia, Bulgaria

April 1, 1992

"Impact Delivery of Organics to the Early Earth"

Leigh Brookshaw; LLNL

April 2, 1992

"The Glass Transition in Polymeric Systems"

Dieter Heerman; Institut für Theoretische

April 3, 1992

"Materials Studies Utilizing the Shock Compression Technique in the Japanese Inter-University Program"

Akira Sawaoka; Tokyo Institute of Technology, Japan

April 9, 1992

"Angle-Resolved Photoemission from the Normal and Superconducting States of the Cuprate Superconductors"

Daniel Dessau; Stanford University

April 10, 1992

“Pressure-Induced Collapse of the Tetragonal Framework in Silicates and Germanates”

George Wolf; Arizona State University, Tempe

April 17, 1992

“High-Pressure Sintering and Deformation of Silica Aggregates”

Mark Beeman; LLNL

April 17, 1992

“Friction Force Microscopy on Langmuir–Blodgett Film”

Ernst Meyer; University of Basil, Switzerland

April 17, 1992

“Giant Magnetoresistance and Antiferromagnetic Interlayer Coupling in Ferromagnet/Paramagnet Multilayers”

Ernst Meyer and Rene Orderny; University of Basil, Switzerland

April 22, 1992

“Computer Simulations of Fragmentation”

H. J. Melosh; Arizona State University, Tempe

April 23, 1992

“Giant Magnetoresistance and Antiferromagnetic Interlayer Coupling in Ferromagnet/Paramagnet Multilayers”

Allison Chaiken; LLNL

April 29, 1992

“High-Pressure Sintering and Deformation of Silica Aggregates”

Mark Beeman; LLNL

April 30, 1992

“Mechanical Instability in Some Supercooled Liquids”

Pablo DeBenedetti; UC Berkeley

May 12, 1992

“Molecular Computers”

Tom Rust; Lazerus Computing

May 15, 1992

“Application of Kohn–Sham Formalism to Quantum Dots with Realistic Dimension”

Ching Y. Fong; UC Davis

June 11, 1992

“Solid Hydrogen at High Pressure: Modeling of Dielectric Properties”

Alberto Garcia; UC Berkeley

June 25, 1992

“A Molecular Dynamics Simulation of Wearless Friction Between Ordered Films of Short Organic Chains”

James Glosli; IBM Almaden Research, San Jose, CA

June 29, 1992

“Ab Initio Studies on High-Pressure Phase of Ice”

Changyol Lee; Harvard University, Cambridge, MA

July 23, 1992

“Interatomic Potentials from Sub-Doppler Lineshape”

Kurt Gibble; Stanford University

August 3, 1992

“Partially Ionized Dense Plasmas: Theory of Equilibrium and Nonequilibrium Properties”

Wolf Kraeft; University of Greifswald, Germany

August 13, 1992

“Materials by Computer Design”

Christian Mailhot; LLNL

August 21, 1992

“The Paired-Electron Crystal”

Neil Ashcroft; Cornell University, Ithaca, NY

August 27, 1992

“Theoretical Studies of Fluorine and Hydrogen Interactions with Silicon (100) Surfaces”

Christine Jiang Wu; UC Los Angeles

September 10, 1992

“Catastrophe Disruption: From Laboratory Experiments to Asteroid Impacts”

Eileen Ryan; University of Arizona, Tucson

## Appendix B

---

October 6, 1992

"Critical Phenomena in Metallic Liquids"

Sergei Stishov; Institute of Crystallography, Moscow

December 7, 1992

"Magnetic Instability Induced by Pressure in Cubic Ce Intermetallics"

Patrizia Monachesi; Università dell'Aquila, Italy

December 10, 1992

"Application of Synchrotron Radiation in High-Pressure Diamond Anvil Cell Research"

David Mao; Carnegie Institute of Washington

January 12, 1993

"Theoretical Calculations of the Structural Stability of Elemental Rare Earths and Actinides"

John Wills; Los Alamos National Laboratory, NM

March 30, 1993

"From Quantum Mechanics to Atomistic Modeling Materials Science: A Challenge for Computer Simulations"

Roberto Car; University of Geneva and IRRMA, Lausanne, Switzerland

March 31, 1993

"Nonlinear Optics Probe of Electronic States of Alkali Halides at High Pressure"

William Daniels; University of Delaware, Newark

June 3, 1993

"Detonation of Condensed Explosives: Multiscale Approach"

Roger Cheret; Commissariat à l'Energie Atomique, Paris, Cedex, France

July 8, 1993

"Condensed Matter Problems in Stellar Astrophysics"

Gilles Chabrier; France

August 27, 1993

"A New Laser (16 to 18  $\mu\text{m}$ ) for Use in Photo-Induced Raman and Reflection Studies of High-Temperature Superconductors"

Eugene Kudriavtsev; Lebedev Physical Institute, Russian Academy of Sciences, Russia

February 3, 1994

"Theoretical Modeling of Island Growth During the Early Stages of Epitaxy"

Steven Bales; Sandia National Laboratory, Livermore

February 11, 1994

"First-Principles Calculations for (100) Semiconductor Surfaces"

A. Garcia; Xerox PARC

February 14, 1994

"Dielectric Properties and Pressure-Induced Phase Transition of Stishovite"

Changyol Lee; Cornell University, Ithaca, NY

February 17, 1994

"Magnetism and Normal-State Properties of the  $t$ - $J$  Model"

Y. R. Wang; Xerox Webster

March 3, 1994

"Microanalysis of the Structure of Epitaxially Grown Superconducting Thin Films"

Rich Howell; LLNL

March 4, 1994

"Some Theoretical Considerations Involving Diamond Recovery in Dynamic Experiments"

Robert G. Arkhipov; Ree

March 10, 1994

"Optical Studies of Novel Strain-Layered Quantum Well Heterostructures"

W. Zhou

March 31, 1994

"Biometrics Biomaterials: What's in it for H-Division?"

D. Young; LLNL

April 7, 1994

"Electron-Lattice Interaction at Semiconductor Surfaces"

Oleg Pankratov

April 12, 1994

"Low- and High-Temperature Phases of Clean and Pb-Covered Ge(111) Surfaces"

Annabella Selloni; University of Geneva

April 14, 1994

“Charge-Transfer Phenomena in Polyphenylenevinylene/  
Molecularly Doped-Polymer Bilayer Devices”

Homer Antoniadis; Xerox

April 28, 1994

“Investigations of New Photonic Materials: Silicon  
Nanocrystals and Fullerenes”

Howard Lee; LLNL

June 2, 1994

“Ultrafast All-Optical Computations Using Conjugated  
Polymers”

Andrew W. Hays; UC Santa Barbara

June 9, 1993

“Powders under Shock Loading and Controlled High-  
Rate Shear Deformation”

Vitalii Nesterenko; UC San Diego and Novosibirsk  
State University

June 14, 1994

“Conjugated Polymers for Use in Schottky Devices”

Khashaya Pakbaz; UC Santa Barbara

June 16, 1994

“Properties of Nitrogen-Doped ZnSe”

Tony Chen; UC Berkeley and Lawrence Berkeley  
National Laboratory

June 30, 1994

“Organic Semiconductor Light-Emitting Diodes”

Ming Yan; AT&T Bell Labs

July 14, 1994

“Ultrahigh Pressure Research with the Femtosecond  
Laser”

Richard More; LLNL

July 21, 1994

“Cathodic Arc Deposition of Amorphous Diamond  
Thin Films”

Steve Falabella; LLNL

July 22, 1994

“Raman Scattering in Natural and C<sub>13</sub>-Enriched  
Diamond at High Pressure”

Sergei M. Stishov; Institute of High-Pressure Physics,  
Troitsk, Russia

August 4, 1994

“Electric Field Modulation Spectroscopy of Light-  
Emitting Molecules and Polymers”

Tom Hagler; Los Alamos National Laboratory, NM

August 9, 1994

“A Unified Picture: Crystal Structures of Metals”

Soderlind; University of Uppsala

August 11, 1994

“Ab Initio Study of Liquid Boron”

Gilles Zerah; Centre d'Etudes de Limeil, France

August 12, 1994

“Nonlinear Optical Probes of Solids Under Pressure”

Magnus Lipp; University of Missouri, Columbia

August 25, 1994

“Planar Fault Energies in Substitutionally Disordered  
TiAl Alloys”

Chris Woodward

September 15, 1994

“A Constitutive Model Based on Microstructure”

Steward Keeton; LLNL

September 22, 1994

“Dielectric Properties of Hydrogen Under High Pressure”

William J. Evans

## **Workshops**

July 17–18, 1991

“Impacts in Experiments and in Nature”

Held at IGPP–LLNL

June 28, 1993

Joint AIRAPT/APS Topical Conference on High-Pressure  
Science and Technology, Iron Section





---

## **Appendix C**

**IGPP-LLNL Bibliography  
1990-1995**

---



# 1990

- Alcock, C. (1990), "Stellar Evolution: Lumps in Planetary Nebulae," *Nature* **344**, 381.
- Alcock, C., D. Dearborn, G. Fuller, G. Mathews, and B. Meyer (1990), "Late-Time Dissipation of Primordial Baryon-Number Fluctuations and Nucleosynthesis," *Phys. Rev. Lett.* **64**, 2607.
- Ammon, C. J., G. Randall, and G. Zandt (1990), "On the Non-Uniqueness of Receiver Function Inversions," *J. Geophys. Res.* **95**, 15303.
- Ammon, C. J., and J. Vidale (1990), "Seismic Travel-Time Tomography using Combinational Optimization Techniques," *Seismol. Res. Lett.* **61**, 39.
- Anderson, O. (1990), "The High-Pressure Triple Points of Iron and Their Effects on the Heat Flow from the Earth's Core," *J. Geophys. Res.* **95**, B13, 21697.
- Aoki, K., B. Baer, H. C. Cynn, and M. Nicol (1990), "High-Pressure Raman Study of One-Dimensional Crystals of the Very Polar Molecule Hydrogen Cyanide," *Phys. Rev. B* **42**, 4298.
- Aster, R. (1990), "Analysis of High Frequency Seismic Noise in the Western U.S. and Eastern Kazakhstan," *Bull. Seismol. Soc. Am.* **80**, 951.
- Aster, R., P. Shearer, and J. Berger (1990), "Quantitative Measurements of Shear-Wave Polarizations at the Anza Seismic Network, Southern California—Implications for Shear-Wave Splitting and Earthquake Prediction," *J. Geophys. Res.* **95**, B8, 12449.
- Baer, B., and M. Nicol (1990), "High-Pressure Binary Phase Diagram of N<sub>2</sub>-O<sub>2</sub> at 295 K Determined by Raman Spectroscopy," *J. Phys. Chem.* **94**, 1073.
- Baer, B., and M. Nicol (1990), "Raman Spectra of the Lattice Vibrations of Solid Nitrogen Near Room Temperature," *High-Pressure Res.* **4**, 511.
- Baer, B., J. Oxley, and M. Nicol (1990) "The Phase Diagram of RDX (hexahydro-1,3,5-trinitro-S-triazine) under Hydrostatic Pressure," *High-Pressure Res.* **2**, 99.
- Band, D., R. Klein, J. Castor, and J. Nash (1990), "Iron K-Shell Emission from NGC 1068," *Astrophys. J.* **362**, 90.
- Baum, S. A., T. Heckman, and W. van Breugel (1990), "Long-Slit Optical Spectroscopy of Emission-Line Nebulae in Radio Galaxies: The Data," *Astrophys. J. Suppl. Ser.* **74**, 389.
- Bazan, G. and G. Mathews (1990), "Metallicity-Dependent Stellar Ages and the G Dwarf Problem," *Astrophys. J.* **354**, 644.
- Beck, S. L., and D. H. Christensen (1990), "Asperity Distribution Along the Aleutian-Alaska Subduction Zone," *Seismol. Res. Lett.* **61**, 33.
- Beck, S. L., and S. P. Nishenko (1990), "Variations in the Earthquake Rupture Mode along the Central Peru Subduction Zone," *Geophys. Res. Lett.* **17**, 1969.
- Beck, S. L., and H. J. Patton (1990), "Inversion of Regional Surface-Wave Spectra for Source Parameters of Aftershocks from the Loma Prieta Earthquake," *Seismol. Res. Lett.* **61**, 47.
- Becker, R., R. White, B. McLean, D. Helfand, and S. Zoonematkermani (1990), "A 20 cm Survey of Compact Sources in the Northern Galactic Plane," *Astrophys. J.* **358**, 458.
- Becker, R., R. White, and A. Edwards (1990), "A New Catalog of 53,522 4.85 GHz Sources," *Astrophys. J.* **365**, 803.
- Bennett, D., and F. Bouchet (1990), "Cosmic String Evolution," *Phys. Rev. Lett.* **63**, 2776.

## Appendix C

---

- Bennett, D., and S. H. Rhie (1990), "Cosmological Evolution of Global Monopoles and the Origin of Large-Scale Structures," *Phys. Rev. Lett.* **65**, 1709.
- Benz, H., R. Smith, and W. Mooney (1990), "Crustal Structure of the Northwestern Basin and Range Province from the 1986 Program for Array Seismic Studies of the Continental Lithosphere Seismic Experiment," *J. Geophys. Res.* **95**, B13, 21823.
- Bouchet, F. R., and D. P. Bennett (1990), "Galaxy Formation from Kinky Cosmic Strings," *Astrophys. J. Lett.* **354**, L41.
- Brodie J., J. Bixler, W. Craig, R. H. Donnelly, C. Hailey, and L. Seppala (1990), "The Design and Construction of an Automated Multi-Object Spectroscopy System," *Instrumentation in Astronomy 7* (SPIE—Society of Photo-Optical Instrumentation Engineers, Bellingham, WA, Proc. SPIE **1235**), p. 722.
- Burnard, D. J., J. Arons, and R. I. Klein (1990), "Accretion Powered Pulsars: Continuum Spectra and Light Curves of Settling Accretion Mounds," *Astrophys. J.* **367**, 575.
- Burnard, J. J., R. I. Klein, and J. Arons (1990), "Continuum Radiation Transfer in X-Ray Pulsar Accretion Columns: Incoherent Scattering," *Astrophys. J.* **349**, 262.
- Cameron, K., J. V. Robinson, G. Nimz, and S. Niemeyer (1990), "Geochemistry of Deep Crustal Xenoliths from Northern Mexico: Implication Regarding Cenozoic Crustal Growth and Recycling," *J. Geophys. Res.* (submitted).
- Cherniak, D. J., W. A. Lanford, and F. J. Ryerson (1990), "The Use of Ion Beam Techniques to Characterize Lead Diffusion in Minerals," *Nucl. Instrum. Methods.* **B45**, 230.
- Chiappetti, L., A. Treves, G. Branduardi-Raymont, A. L. Ciapi, E. N. Ercan, P. E. Freeman, S. M. Kahn, L. Maraschi, F. B. S. Paerels, and E. G. Tanzi (1990), "Exosat Observations of Cygnus X-2 Continuum and Line Spectrum," *Astrophys. J.* **361**, 596.
- Constable, S., and A. Duba (1990), "Electrical Conductivity of Olivine, a Dunite, and the Mantle," *J. Geophys. Res.* **95**, B5, 6967.
- Dearborn, D., G. Raffelt, P. Salati, J. Silk, and A. Bouquet (1990), "Dark Matter and the Age of Globular Clusters," *Nature* **343**, 347.
- Dearborn, D., G. Raffelt, P. Salati, J. Silk, and A. Bouquet (1990), "Dark Matter and Thermal Pulses in Horizontal Branch Stars," *Astrophys. J.* **354**, 568.
- Dermer, C. (1990), "Compton Scattering in Strong Magnetic Fields and the Continuum Spectra of Gamma-Ray Bursts: Basic Theory," *Astrophys. J.* **360**, 197.
- Dermer, C., K. Hurley, and D. Hartmann (1990), "X-Ray Echoes from Gamma-Ray Bursts," *Astrophys. J.* (submitted).
- Drake, T. G. (1990), "Structural Features in Granular Flows," *J. Geophys. Res.* **95**, 8681.
- Drake, T. G. (1990), "Physical Experiments and Kinetic Theories of Granular Flow," *J. Fluid Mech.* (submitted).
- Flegal, A. R., H. Maring, and S. Niemeyer, S. (1990), "Isotopic Characterization of Contaminant Lead in the Antarctic" (submitted).
- Fletcher, J., T. Fumal, L. Hsi-Ping, and R. Procella (1990), "Near-Surface Velocities and Attenuation at Two Boreholes near Anza, California, from Logging Data," *J. Geophys. Res.* (submitted).
- Fuller, G., and R. Malaney (1990), "A New Cosmological Limit on Neutrino Mass," *Phys. Rev. D* (submitted).
- Godwal, B. K., and R. Jeanloz (1990), "Pressure-Induced s-d Transfer and the Equation of State of Molybdenum," *Phys. Rev. B* **41**, 7440.
- Gould, A., and G. Raffelt (1990), "Thermal Conduction by Massive Particles," *Astrophys. J.* **352**, 654.
- Gould, A., and G. Raffelt (1990), "Cosmic Energy Transfer in Stars: The Knudsen Limit," *Astrophys. J.* **352**, 669.
-

- 
- Gurrola, H., J. B. Minster, H. K. Given, F. L. Vernon, J. Berger, and R. Aster (1990), "Analysis of High Frequency Seismic Noise in the Western U.S. and Eastern Kazakhstan," *Bull. Seismol. Soc. Am.* **80**, 951.
- Hirsch, L. M. (1990), "Electrical Conduction of  $\text{Co}_2\text{SiO}_4$ ," *Phys. Chem. Miner.* **17**, 187.
- Hoshino, M., and J. Arons (1990), "Preferential Positron Heating and Acceleration by Synchrotron Maser Instabilities in Relativistic Positron-Electron-Proton Plasmas," Lawrence Livermore National Laboratory, Livermore, CA, UCRL-105299; *Phys. Fluids B* (submitted).
- Isaak, D., R. Cohen, and M. J. Mehl (1990), "Calculated Elastic and Thermal Properties of MgO at High Pressures and Temperatures," *J. Geophys. Res.* **95**, B5, 7055.
- Jeanloz, R., B. K. Godwal, and C. Meade (1990), "Static Strength and Equation of State of Re to 120 GPa," *Nature* (submitted).
- Kahn, S. M. (1990), "High Throughput Dispersive X-Ray Spectroscopy with Reflection Gratings," in IAU Colloquium No. 115, *High Resolution X-Ray Spectroscopy of Cosmic Plasmas*, Cambridge University Press, P. Gorenstein and M. Zombeck, Eds.
- Kajino, T., G. Mathews, and G. Fuller (1990), "Primordial Nucleosynthesis of Intermediate-Mass Elements in Baryon-Number Inhomogeneous Big-Bang Models: Observational Tests," *Astrophys. J.* **364**, 7.
- Keto, E. (1990), "Collapse of Self-Gravitating Protostellar Condensations in DR 21," *Astrophys. J.* **350**, 722.
- Keto, E. (1990), "Radiative Transfer Modeling of Radio-Frequency Spectral Line Data: Accretion onto G 10.6-0.4," *Astrophys. J.* **355**, 190.
- Klein, R., and J. Arons (1990), "Time-Dependent Two-Dimensional Radiation Hydrodynamics of Accreting Matter onto Highly Magnetized Neutron Stars," *Proceedings of the 23rd ESLAB Symp. on Topics in X-Ray Astronomy*, Bologna, Italy **1**, 89.
- Koch, R., W. J. Nellis, J. W. Hunter, H. Davidson, and T. H. Geballe (1990), "Microstructures of Nb Films Recovered from Megabar Dynamic Pressures," *Pract. Met.* **27**, 391.
- Kohn, M. J., and F. S. Spear (1990), "Two New Geobarometers for Garnet Amphibolites with Applications to Southeastern Vermont," *Am. Mineral.* **75**, 89-96.
- Kurki-Suonio, H., G. Mathews, and G. Fuller (1990), "Deviation from Periodicity in the Large-Scale Distribution of Galaxies," *Astrophys. J. Lett.* **356**, L5.
- Kramer, M. J., L. S. Chumbley, R. W. McCallum, W. J. Nellis, S. T. Weir, and E. P. Kvam (1990), "Deformation Induced Defects in  $\text{ReBa}_2\text{Cu}_3\text{O}_{7-x}$  by Shock Compaction," *Physica C* **166**, 115.
- Lattanzio, J. (1990), "Hydrodynamical Simulations of Collisions Between Interstellar Clouds," *5th Workshop Proceedings, Nonlinear Astrophysical Fluid Dynamics*, Oct. 5-7, 1989 (in press); Lawrence Livermore National Laboratory, Livermore, CA, UCRL-102500.
- Lattanzio, J., and R. Malaney (1990), "The Lithium Problems," *Comments Astrophys.* **15**, 31.
- Liedahl, D., S. Kahn, A. Osterheld, and W. Goldstein (1990), "X-Ray Spectral Signatures of Photoionized Plasmas," *Astrophys. J. Lett.* **350**, L37.
- Malaney, R., and C. Alcock (1990), "On Interstellar Lithium Toward SN 1987A as an Indicator of Primordial Lithium," *Astrophys. J.* **351**, 31.
- Malaney, R., B. Meyer, and M. Butler (1990), "Solar Antineutrinos," *Astrophys. J.* **352**, 767.
- Mathews, G., B. S. Meyer, and C. Alcock (1990), "Coupled Baryon Diffusion and Nucleosynthesis in the Early Universe," *Astrophys. J.* **358**, 36.
-

## Appendix C

---

- Mathews, G., C. Alcock, and G. Fuller (1990), "Galactic Chemical Evolution with Low and High Primordial Lithium," *Astrophys. J.* **349**, 449.
- McCarthy, P. J., V. K. Kapahi, W. van Breugel, and C. R. Subrahmanya (1990), "High Red-Shift Radio Galaxies from the Molonglo Catalogue," *Astron. J.* **100**, 1014.
- McCarthy, P. J., H. Spinrad, W. van Breugel, J. Liebert, M. Dickinson, S. Djorgovski, and P. Eisenhardt (1990), "Extended Ly  $\alpha$  Emission Associated with 3C 294," *Astrophys. J.* **365**, 487.
- McNamara, D. E. (1990), *Evidence for Azimuthal Seismic Anisotropy in the Basin and Range Province: Implications for Middle to Lower Crustal Tectonic Processes*, M.S. Thesis, University of Missouri.
- Meyer, B. S., C. R. Alcock, G. Mathews, and G. Fuller (1990), "Spectrum of QCD Nucleation-Site Separations and Primordial Nucleosynthesis," Lawrence Livermore National Laboratory, Livermore, CA, UCRL-104313; *Phys. Rev.* (submitted).
- Mitchell, A. C., W. J. Nellis, N. C. Holmes, D. J. Erskine, P. C. McCandless, D. L. Ravizza, and L. D. Cassidy (1990), "Equation-of-State Data of Synthetic Uranus," *High Press. Sci. and Tech.*, W. B. Holzapfel and P. G. Johansen, Eds. (Gordon and Breach, London), p. 845.
- Nellis, W., and C. S. Yoo (1990), "Issues Concerning Shock Temperature Measurements of Iron and Other Metals," *J. Geophys. Res.* **95**, B13, 21749.
- Nellis, W. J., R. Koch, H. Davidson, J. W. Hunter, W. F. Brocious, A. Marshall, and T. H. Geballe (1990), "Micron-Thin Nb Films Recovered from Mbar Shock Pressures," *Shock Compression of Condensed Matter*, S. C. Schmidt, J. N. Johnson, and W. J. Davidson, Eds. (Elsevier, Amsterdam), p. 543.
- Nelson, G. D., and J. E. Vidale (1990), "Earthquake Locations by 3-D Finite-Difference Travel Times," *Bull. Seismol. Soc. Am.* **80**, 395.
- Nimz, G., K. L. Cameron, and S. Niemeyer (1990), "Mantle Pyroxenites Formed During Mid-Cenozoic Arc Magmatism in Western Mexico," *Contrib. Mineral. Petrol.* (submitted).
- Pasternak, M., D. Taylor, A. Chen, C. Meade, L. M. Falicov, A. Giesekeus, R. Jeanloz, and P. Yu (1990), "Pressure-Induced Metallization and the Collapse of the Magnetic State in the Antiferromagnetic Insulator  $\text{NiI}_2$ ," *Phys. Rev. Lett.* **65**, 790.
- Radousky, H. B., A. C. Mitchell, and W. J. Nellis (1990), "Shock Temperature Measurements of Planetary Ices:  $\text{NH}_3$ ,  $\text{CH}_4$ , and 'Synthetic Uranus'," *Chem. Phys.* **93**, 8235.
- Raffelt, G. (1990), "New Bound on Neutrino Dipole Moments from Globular Cluster Stars," *Phys. Rev. Lett.* **64**, 2856.
- Raffelt, G. (1990), "Core Mass at the Helium Flash from Observations and a New Bound on Neutrino Electromagnetic Properties," *Astrophys. J.* **365**, 559.
- Ross, M., D. Young, and R. Grover (1990), "Theory of the Iron Phase Diagram at Earth Core Conditions," *J. Geophys. Res.* **95**, B13, 21713.
- Ryerson, F., and T. Harrison (1990), "Degassing of Argon from Microclines within the Thermal Aureole of the Obsidian Dome Conduit, Long Valley Caldera, California: Constraints on Emplacement History," *J. Geophys. Res.* **95**, 2781.
- Ryerson, F. J., and M. L. Beeman (1990), "Rheology of Partially Molten Rocks," in *McGraw-Hill Yearbook of Science and Technology*, McGraw-Hill, p. 368.
- Salati, P., G. Raffelt, and D. Dearborn (1990), "Thermal Relaxation Oscillations in Horizontal Branch Stars," *Astrophys. J.* **357**, 566.
- Schachter, J., A. Filippenko, and S. Kahn (1990), "Bowen Fluorescence in a Sample of Seyfert Nuclei," *Astrophys. J.* **362**, 74.
-

- 
- Schwartz, S., T. Lay, and S. Beck (1990), "Shear Wave Travel Time, Amplitude, and Waveform Analysis for Earthquakes in the Kurile Slab: Constraints on Deep Slab Structure and Mantle Heterogeneity," *J. Geophys. Res.* (submitted).
- Seaman, C. L., S. T. Weir, E. A. Early, M. B. Maple, W. J. Nellis, P. C. McCandless, and W. F. Brocious (1990), "Crystallographically Oriented Superconducting  $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_8$  by Shock Compaction of Prealigned Powder," *Appl. Phys. Lett.* **57**, 93.
- Seaman, C. L., E. A. Early, M. B. Maple, W. J. Nellis, J. B. Holt, M. Kamegai, and G. S. Smith (1990), "Superconducting and Microstructural Properties of Shock Compacted High-TC Oxide Powders," in *Shock Compression of Condensed Matter*, S. C. Schmidt, J. N. Johnson, and L. W. Davison, Eds. (Elsevier Sci. Pub.) p. 571.
- Shankland, T. J., O. Anderson, and D. Young (1990), "Ironworkers Convention I: Workshop on Physics of Iron," *J. Geophys. Res.* **95**, B13, 21689.
- Smith, D. R., S. Niemeyer, J. A. Estes, and A. R. Flegal (1990), "Lead Isotopic Composition in Preindustrial and Contemporary Sea Otters: Evidence of Contamination," *Environ. Sci. Technol.* **24**, 1517.
- Southon, J. R., M. W. Caffee, J. C. Davis, T. L. Moore, I. D. Proctor, B. S. Schumacher, and J. S. Vogel (1990), "The New LLNL AMS Spectrometer," *5th International Conf. on Accelerator Mass Spectrometry*, Paris, France.
- Spear, F. S., M. J. Kohn, T. Menard, and F. P. Florence (1990), "A Model for Garnet and Plagioclase Growth in Pelitic Schists: Implications for Thermobarometry and P-T Path Determinations," *J. Metamorphic Geol.* **8**, 683-696.
- Stixrude, L., and M. S. T. Bukowinski (1990), "Rings, Topology, and the Density of Tectosilicates," *Am. Mineral.* **75**, 1115.
- Stixrude, L., and M. S. T. Bukowinski (1990), "A Novel Topological Compression Mechanism in a Covalent Liquid," *Science* **250**, 541.
- Stixrude, L., and M. S. T. Bukowinski (1990), "Fundamental Thermodynamic Relations and Silicate Melting with Implications for the Constitution of D," *J. Geophys. Res.* **95**, 19311.
- Stixrude, L., and M. S. T. Bukowinski (1990), "The Atomic Structure of  $\text{SiO}_2$  Glass and its Response to Pressure," *Phys. Rev.* (submitted).
- Tavani, M. (1990), "Birthrates of Galactic Millisecond Pulsars and their Low-Mass X-Ray Binary Precursors," *Astrophys. J. Lett.* **366**, L7.
- Vitello, P., and C. Dermer (1990), "A Theory of Gamma-Ray Bursts Based on Resonant Compton Scattering," *Astrophys. J.* (submitted).
- Vidale, J. E. (1990), "3-D Finite-Difference Travel Time Calculation," *Geophysics* **55**, 521.
- Vidale, J. E., and H. Houston (1990), "Rapid Calculation of Seismic Amplitudes," *Geophysics* **55**, 1504.
- Weir, S. T., W. J. Nellis, M. J. Kramer, C. Seaman, E. A. Early, and M. B. Maple (1990), "Increase in the Flux-Pinning Energy of  $\text{YBa}_2\text{Cu}_3\text{O}_{7-\delta}$  by Shock Compaction," *Appl. Phys. Lett.* **56**, 2042.
- Weir, S. T., W. J. Nellis, C. L. Seaman, and M. B. Maple (1990), "Magnetic Properties of Compacted  $\text{YBa}_2\text{Cu}_3\text{O}_{7-\delta}$  and Other Materials," in *Shock Compression of Condensed Matter*, S. C. Schmidt, J. N. Johnson, and L. W. Davison, Eds. (Elsevier, Amsterdam) p. 563.
- Williams, Q., E. Knittle, R. Reichlin, S. Martin, and R. Jeanloz (1990), "Structural and Electronic Properties of  $\text{Fe}_2\text{SiO}_4$ —Fayalite at Ultrahigh Pressures: Amorphization and Gap Closure," *J. Geophys. Res.* **95**, B13, 21549.
- Woosley, S. E., and W. M. Howard (1990), " $^{146}\text{Sm}$  by the Gamma-Process," *Astrophys. J. Lett.* **354**, L21.
- Zandt, G., S. Jarpe, and H. M. Benz (1990), "NTS Seismic Yield Experiment: Rubble Zone Imaging," *Seismol. Res. Lett.* **61**, 11.
- Zoonematkermani, S., D. Helfand, R. Becker, R. White, and R. Perley (1990), "A Catalog of Small-Diameter Radio Sources in the Galactic Plane," *Astrophys. J. Suppl. Ser.* **74**, 181.
-

# 1991

- Ammon, C. J. (1991), "The Isolation of Receiver Effects from Teleseismic P Waveforms," *Bull. Seismol. Soc. Am.* **81**, 2504.
- Anderson, O. L. (1991), "Accurate Thermal Expansivity Measurements in the Range 1500-2000 K are Needed for Minerals," *Int. J. Thermophys.* **12**, 757.
- Anderson, O. L., D. Isaak, and H. Oda (1991), "Thermoelastic Parameters for Six Minerals at High Temperature," *J. Geophys. Res.* **96**, 18037.
- Aufderheide, M. B., E. Baron, and F. K. Thielemann (1991), "Shock Waves and Nucleosynthesis in Type II Supernovae," *Astrophys. J.* **370**, 630.
- Badde, D., S. Cristiani, T. Lanz, R. Malaney, K. C. Sahu, and G. Vladilo (1991), "Reduced Upper Limits on the Equivalent Width of Interstellar Li 670.8 towards SN 1987A," *Astron. Astrophys.* **251**, 253.
- Beck, S. L., and D. H. Christensen (1991), "Rupture Process of the February 4, 1965, Rat Islands Earthquake," *J. Geophys. Res.* **96**, 2905.
- Beck, S., and H. Patton (1991), "Inversion of Regional Surface-Wave Spectra for Source Parameters of Aftershocks from the Loma Prieta Earthquake," *Bull. Seismol. Soc. Am.* **81**, 1726.
- Becker, R. H., R. White and A. L. Edwards (1991), "A New Catalog of 53,522 4.85-GHz Sources," *Astrophys. J.* **75**, 1.
- Bennett, D. P., and F. R. Bouchet (1991), "Constraints on the Gravity-Wave Background Generated by Cosmic Strings," *Phys. Rev. D* **43**, 2733.
- Brown, S. R., C. H. Scholz, and J. B. Rundle (1991), "A Simplified Spring-Block Model of Earthquakes," *J. Geophys. Res. Lett.* **18**, 215.
- Caffee, M. W., C. M. Hohenberg, R. Nichols Jr., C. Olinger, J. N. Goswami, R. Wieler, P. Signer, and T. Swindle (1991), "Possible Evidence for Ancient Solar-Cosmic-Ray- Produced Rare Gases," In *The Sun in Time* (M. Matthews, Ed.), University of Arizona.
- Cherniak, D. J., W. A. Lanford, and F. J. Ryerson (1991), "A Lead Diffusion Study of Zircon and Apatite Using Particle Accelerator-Based Ion Beam Techniques," *Geochim. Cosmochim. Acta* **55**, 1663.
- Colvin, V. L., A. P. Alivisatos, and J. G. Tobin (1991), "Valence Band Photoemission from a Quantum Dot System," *Phys. Rev Lett.* **66**, 2786.
- Colvin, V. L., A. N. Goldstein, and A. P. Alivisatos (1991), "Semiconductor Nanocrystals Covalently Bound to Metal Surfaces Using Self Assembled Monolayers," *J. Am. Chem. Soc.* (submitted).
- Constable, S., T. J. Shankland, and A. Duba (1991), "Electrical Conductivity of Isotopic Olivine Mantle," *J. Geophys. Res.* (in press)
- Dearborn, D., K. Griest, and G. Raffelt (1991), "Window for the Dark Matter Solution to the Solar Neutrino Problem," *Astrophys. J.* **368**, 626.
- Dermer, C. D., Hurley, K. C., and Hartmann, D. H. (1991), "X-Ray Echoes from Gamma-Ray Bursts," *Astrophys. J.* **370**, 341.
- Dickel, J. R., W. van Breugel, and R. G. Strom (1991), "Radio Structure of the Remnant of Tycho's Supernova (SN 1572)," *Astron. J.* **101**, 2151.



- 
- Duong, H., M. Beeman, and J. Wolfenstine (1991), "Creep and Dislocation Substructure of KCl-KBr Solid Solution Alloys," *Scripta Metallurgica et Materialia* (in press).
- Erskine, D. J., and W. J. Nellis (1991), "Shock-Induced Martensitic Phase Transformation of Oriented Graphite to Diamond," *Nature* **349**, 317.
- Fain, S. B., and D. W. Lea (1991), "Variability in  $\delta^{18}\text{O}$ , Strontium and Barium across Annual Growth Bands in a Coral from Musandam Peninsula, Oman," *Paleobios* **13**, 1.
- Flegal, A. R., D. R. Garrison, and S. Niemeyer (1991), "Lead Isotopic Disequilibria between Plankton Assemblages and Surface Waters Reflect Life Cycle Strategies of Coastal Populations within a Northeast Pacific Upwelling Regime," *Limnology Oceanography* (submitted).
- Flegal, A. R., H. Maring, and S. Niemeyer (1991), "Lead Fluxes in Antarctic Surface Waters," *Antarctic J. U.S.* (in press).
- Fuller, G., and B. Meyer (1991), "High-Temperature Neutrino-Nucleus Processes in Stellar Collapse," *Astrophys. J.* **376**, 701.
- Gallup, R. F., C. Y. Fong, A. K. McMahan, and C. Mailhot (1991), "Electronic, Structural, and Mechanical Properties of Possible Metastable Phases of Beryllium Hydride," *High Press. Res.* **6**, 291.
- Hanson, D. R., M. Young, and F. J. Ryerson (1991), "Growth and Characterization of Synthetic Iron-Bearing Olivine," *Phys. Chem. Minerals* **18**, 53.
- Hasse, M., and A. P. Alivisatos (1991), "Arrested Solid-Solid Phase Transition in Semiconductor Nanocrystals," in *Clusters and Cluster Assembled Materials*, *Proc. Mater. Res. Soc.* **206**, 233.
- Hawkins, I., and N. Craig (1991), "Probing Shock Models of  $\text{CH}^+$  Formation," *Astrophys. J.* **375**, 642.
- Heckman, T. M., M. D. Lehnert, G. K. Miley, and W. van Breugel (1991), "Spectroscopy of Spatially Extended Material around High-Redshift Radio-Loud Quasars," *Astrophys. J.* **381**, 373.
- Heckman, T. M., M. D. Lehnert, W. van Breugel, and G. K. Miley (1991), "Spatially Resolved Optical Images of High-Redshift Quasi-Stellar Objects," *Astrophys. J.* **370**, 78.
- Hirsch, L. M., and T. J. Shankland (1991), "Determination of Defect Equilibria in Minerals," *J. Geophys. Res.* **96**, 377.
- Hoshino, M. (1991), "Forced Magnetic Reconnection in a Plasma Sheet with Localized Resistivity Profile Excited by Lower Hybrid Drift Type Instability," *J. Geophys. Res.* **96**, 11555.
- Hoshino, M., and J. Arons (1991), "Preferential Positron Heating and Acceleration by Synchrotron Maser Instabilities in Relativistic Positron-Electron-Proton Plasmas," *Phys. Fluids B* **3**, 818.
- Hudson, G. B., M. W. Caffee, J. Beiriger, B. Ruiz, C. P. Kohl, and K. Nishiizumi (1991), "Production Rates and Retention Properties of Cosmogenic  $^3\text{He}$  and  $^{21}\text{Ne}$  in Quartz," *EOS* **72**, 575.
- Keto, E., G. Jernigan, R. Ball, J. Arens, and M. Meixner (1991), "High Angular Resolution Broad-Band Imaging in the Mid-Infrared: The Infrared-Bright Galaxy NGC 34," *Astrophys. J.* **372**, L87.
- Keto, E. R., J. C. Lattanzio, and J. J. Monaghan (1991), "Gravitational Fragmentation: A Comparison with W49A," *Astrophys. J.* **383**, 639.
- Kluzniak, W., and J. R. Wilson (1991), "Hard X-Ray Spectra from Gap Accretion onto Neutron Stars," *Astrophys. J. Lett.* **372**, L87.
- Kohn, M. J., and F. S. Spear (1991), "Error Propagation for Barometers. 1: Accuracy and Precision of Experimentally Located Endmember Reactions," *Am. Mineral.* **76**, 128-137.
- Kohn, M. J., and F. S. Spear (1991), "Error Propagation for Barometers. 2: Application to Rocks," *Am. Mineral.* **76**, 138-147.
-

## Appendix C

---

- Jeanloz, R., B. K. Godwal, and C. Meade (1991), "Static Strength and Equation of State of Rhenium at Ultra-High Pressures," *Nature* **349**, 687.
- Lattanzio, J. (1991), "Stellar Evolutionary Models from the ZAMS to the First Thermal Pulse," *Astrophys. J.* **76**, 215.
- Lattanzio, J., A. Vallenari, G. Bertelli, and C. Chiosi (1991), "NGC I 866 Revisited: Semiconvection versus Overshoot," *Astron. Astrophys.* **250**, 340.
- Lea, D. W. (1991), "Barium in Coral Bands and Foraminifera Shells: A New Tracer of Ocean and Climate Change," *Paleobios* **13**, 5.
- Lea, D. W., and H. J. Spero (1991), "Experimental Determination of Barium and Cadmium Uptake in Shells of the Planktonic Foraminifera *Orbulina universa* and *Globigerinoides sacculifera*," *Geochim. Cosmochim. Acta* (submitted).
- Lea, D. W., and H. J. Spero (1991), "Experimental Verification of Barium Uptake in Individual Shells of the Planktonic Foraminifera *Orbulina universa* and *Globigerinoides sacculifera*," *Geochim. Cosmochim. Acta* (submitted).
- Margolis, S. V., P. Claeys, and F. T. Kyte (1991), "Microtektites, Microkrystites, and Spinels from a Late Pliocene Asteroid Impact in the Southern Ocean," *Science* **251**, 1594.
- McCathy, P. J., W. van Breugel, V. K. Kapahi, and C. R. Subrahmanya (1991), "High Redshift Radio Galaxies from the Molonglo Catalogue II," *Astron. J.* **102**, 522.
- Monaghan, J., and J. Lattanzio (1991), "A Simulation of the Collapse and Fragmentation of Cooling Molecular Clouds," *Astrophys. J.* **375**, 177.
- Murray, R. W., M. Buchholtz-ten Brink, H. J. Brumsack, D. C. Gerlach, and G. P. Rus III (1991), "Rare Earth Elements in Japan Sea Sediments and Diagenetic Behavior of Ce/Ce\*: Results from ODP Leg 127," *Geochim. Cosmochim. Acta* **55**, 2453.
- Murray, R. W., M. Buchholtz-ten Brink, D. C. Gerlach, G. P. Russ III, and D. L. Ones (1991), "Rare Earth, Major, and Trace Elements in Chert from the Franciscan Complex and Monterey Group, California: Assessing REE Sources to Fine-Grained Marine Sediments," *Geochim. Cosmochim. Acta* **55**, 1875.
- Murray, R. W., D. L. Jones, and M. R. ten Brink (1991), "Diagenetic Formation of Bedded Chert: Evidence from Chemistry of the Chert-Shale Couplet," *Geology* (in press).
- Patton, H. J., and G. Zandt (1991), "Seismic Moment Tensors of Western U.S. Earthquakes and Implications for the Tectonic Stress," *J. Geophys. Res.* **96**, 18245.
- Rhie, S. H., and D. Bennett (1991), "Global Monopoles Do Not 'Collapse'," *Phys. Rev. Lett.* **67**, L1173.
- Rundle, J. B., and S. R. Brown (1991), "Origin of Rate Dependence in Frictional Sliding," *J. Stat. Phys.* **65**, 403.
- Ryerson, F. J., and R. H. Condit (1991), "Point Defects and Diffusion in Minerals," in *Higher Mineralogy*, A. S. Marfunin, Ed. (Springer-Verlag, in press).
- Savage, M., R. Malaney, and G. Fuller (1991), "Neutrino Oscillations and the Leptonic Charge of the Universe," *Astrophys. J.* **368**, 1.
- Schwartz, S., T. Lay, and S. Beck (1991), "Shear Wave Travel Time, Amplitude, and Waveform Analysis for Earthquakes in the Kurile Slab: Constraints on Deep Slab Structure and Mantle Heterogeneity," *J. Geophys. Res.* **96**, 14445.
- Shaham, J., and M. Tavani (1991), "On the Nature and Evolution of the Windy Binary Pulsar PSR 1744-24A," *Astrophys. J.* **377**, 588.
- Smith, D. R., S. Niemeyer, and A. R. Flegel (1991), "Lead Sources to California Sea Otters: Industrial Inputs Circumvent Natural Lead Biodepletion Mechanisms," *Environ. Res.* (in press).

- 
- Smith, D. R., S. Niemeyer, and A. R. Flegel (1991), "Ultra-Low Lead Concentration, Stable Isotopic Composition Labeling of Lead Compartments within the Rat," *Environ. Res.* (in press).
- Spear, F. S., S. M. Peacock, M. J. Kohn, F. P. Florence, and T. Menard (1991), "Computer Programs for Petrologic P-T-t Path Calculations," *Am. Mineral.* **76**, 2009-2012.
- Steck, L. (1991), *Array Analysis of 3-Component Teleseismic P and P-Coda Waves for Crustal Structure at Long Valley Caldera, California*, Ph.D. thesis, University of California at Santa Barbara.
- Steck, L., and W. A. Prothero (1991), "A 3-D Raytracer for Teleseismic Body-Wave Arrival Times," *Bull. Seismol. Soc. Am.* **81**, 1332.
- Swindle, T. D., M. W. Caffee, C. M. Hohenberg, M. M. Lindstrom, and G. J. Taylor (1991), "Iodine-Xenon Studies of Petrographically and Chemically Characterized Chainpur Chondrules," *Geochim. Cosmochim. Acta* **55**, 861-870.
- Tavani, M. (1991), "Birthrates of Galactic Millisecond Pulsars and Their Low-Mass X-Ray Binary Precursors," *Astrophys. J. Lett.* **366**, L27.
- Tavani, M. (1991), "'Hidden' Millisecond Pulsars," *Astrophys. J. Lett.* **379**, L69.
- Tavani, M., and L. Brookshaw (1991), "Outflow Hydrodynamics in the Eclipsing Millisecond Pulsar Binaries PSR 1957+20 and PSR 1744-24A," *Astrophys. J. Lett.* **381**, L21.
- Tavani, M., W. Kluzniak, M. Ruderman, and J. Shaham (1991), "Self-Sustained Mechanism of Mass Transfer and Evolution of Very Low Mass X-Ray Binaries," *Ann. New York Acad. Sci.* **427**.
- Turteltaub K. W., J. S. Felton, B. L. Gledhill, J. S. Vogel, J. R. Southon, M. W. Caffee, R. C. Finkel, D. E. Nelson, I. P. Proctor, and J. C. Davis (1991), "Accelerator Mass Spectrometry in Biomedical Doseimetry: Relationship between Low-level Exposure and Covalent Binding of Heterocyclic Amine Carcinogens to DNA," *Proc. Nat'l. Academy of Sci.* **87**, 5288-5292.
- Velusamy, T., R. Becker, and F. Seward (1991), "G33.6 + 0.1: A Shell-Type Supernova Remnant with Unusual Structure," *Astron. J.* **102**, 676.
- Vitello, P., and C. Dermer (1991), "A Theory of Gamma-Ray Bursts Based on Resonant Compton Scattering," *Astrophys. J.* **374**, 668.
- Wandle, A., and E. Liang (1991), "Hybrid Accretion Disks in Active Galactic Nuclei. I. Structure and Spectra," *Astrophys. J.* **380**, 84.
- Weir, S. T., W. J. Nellis, C. L. Seaman, E. A. Early, M. B. Maple, M. Kikuchi, and Y. Syono (1991), "Shock Consolidation of Crystallographically Aligned  $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_x$  Powders," *Phys. C* **184**, 1.
- Wenk, H.-R. (1991), "Standard Project for Pole Figure Determination by Neutron Diffraction," *J. Appl. Cryst.* **24**, 920.
- Wenk, H. R., and G. R. Canova (1991), "Texture Evolution in Minerals: Modeling and Experimental Results," in *Modeling the Deformation of Crystalline Solids*, T. C. Lowe, A. D. Rollett, P. S. Follansbee, and G. S. Daehn, Eds. (Minerals, Metals, and Materials Society, Warrendale, PA), p. 349.
- Wenk, H. R., and J. M. Christie (1991), "Comments on Interpretation of Deformation Textures in Rocks," *J. Struct. Geol.* **13**, 1091.
- White, R. L., R. H. Becker, and D. J. Helfand (1991), "The Infrared Properties of Compact Galactic Radio Sources: The Young and the Restless," *Astrophys. J.* **371**, 148.
- Yoo, C. S., and W. J. Nellis (1991), "Phase Transformations in Carbon Fullerenes at High Shock Pressures," *Science* **254**, 1489.
-

# 1992

- Anderson, O. L., D. Isaak, and H. Oda (1992), "High-Temperature Elastic Constant Data on Minerals Relevant to Geophysics," *Rev. Geophys.* **30**, 57.
- Arons, J. (1992), "Magnetospheres of Rotation-Powered Pulsars," in *Magnetospheric Structure and Emission Mechanisms of Radio Pulsars*, *Proc. IAU Colloq. No. 128*, T. H. Hankins, J. M. Rankin, and J. Gil, Eds. (Pedagogical University Press, Zielona Gora), p. 56.
- Arons, J. (1992), "Photon Bubbles: Overstability in a Magnetized Atmosphere," *Astrophys. J.* **388**, 561.
- Arons, J. (in press), "Relativistic Shock Waves and the Excitation of Plerions," in *Collective Acceleration Processes in Collisionless Plasmas*, D. Le Queau, Ed. (Les Editions de Physique, Paris).
- Arons, J. (1992), "Relativistic Shock Waves and the Excitation of Plerions," in *X-Ray Binaries and the Formation of Binary and Millisecond Radio Pulsars*, E. P. J. van den Heuvel and S. A. Rappaport, Eds. (Kluwer, Boston), p. 361.
- Arons, J., Y. Gallant, M. Hoshino, A. B. Langdon, and C. E. Max (1992), "Relativistic Shocks and the Excitation of Plerions," in *Magnetospheric Structure and Emission Mechanisms of Radio Pulsars*, *Proc. IAU Colloq. No. 128*, T. H. Hankins, J. M. Rankin, and J. Gil, Eds. (Pedagogical University Press, Zielona Gora), p. 78.
- Ayers J. C., J. M. Brennan, E. B. Watson, D. A. Wark, and W. G. Minarik (1992), "A New Capsule Technique for Hydrothermal Experiments using the Piston Cylinder Apparatus," *Am. Min.* **77**, 1080–1086.
- Ball, R. (1992), "A Dynamical Analysis of the Barred Spiral Galaxy NGC 3359," *Astrophys. J.* **395**, 418.
- Ball, R., J. Arens, G. Jernigan, E. Keto, and M. Meixner (1992), "Thermal Dust Imaging: The Onset of Asymmetry in the Ultracompact HII Region," *Astrophys. J.* **389**, 616.
- Barg, E., D. Lal, A. J. T. Jull, J. Southon, M. W. Caffee, R. C. Finkel, and M. Pavich (1992), "Applications of Cosmogenic Nuclear Methods for Studying Soil Erosion and Formation Rates," In *Water-Rock Interaction* (Kharakaa and Maest, Eds.), 541–543, Balkema, Rotterdam.
- Becker, R. H., D. J. Helfand, and R. L. White (1992), "The Discovery of an X-Ray Selected, Radio-Loud Quasar at  $z=3.9$ ," *Astron. J.* **104**, 531.
- Becker, R. H., R. L. White, and D. D. Proctor (1992), "A Serendipitous Survey of the Galactic Plane for Type II OH Masers," *Astron. J.* **103**, 544.
- Bennett, K., H.-R. Wenk, A. Gratz, M. Bourke, and J. A. Goldstone (1992), "Neutron Diffraction of Shock-Loaded Low-Temperature D<sub>2</sub>O Ice," *EOS Trans. Am. Geophys. Union* **73**, 326.
- Bennet, D., A. Stebbins, and F. Bouchet (1992), "The Implications of the COBE Diffuse Microwave Radiation Result for Cosmic Strings," *Astrophys. J. Lett.* **399**, L5.
- Benz, H. M., G. Zandt, and D. H. Oppenheimer (1992), "Lithospheric Structure of Northern California from Teleseismic Images of the Upper Mantle," *J. Geophys. Res.* **97**, 4791.
- Caffee, M. W., R. C. Finkel, G. J. Nimz, and J. Borchers (1992), "Isotopic Composition of Chlorine in Groundwater from the Wawona Basin, Yosemite National Park," *EOS* **73**, 173. Baum, S. A., T. M. Heckman, and W. van Breugel (1992), "Spectroscopy of Emission-Line Nebulae in Powerful Radio Galaxies: Interpretation," *Astrophys. J.* **389**, 208.
- Cameron, K. L., J. V. Robinson, S. Niemeyer, G. J. Nimz, D. C. Kuentz, R. S. Harmon, S. R. Bohlen, and K. D. Collerson (1992), "Contracting Styles of PreCenozoic and Mid-Tertiary Crustal Evolution in Northern Mexico: Evidence from Deep Crustal Xenoliths from La Olivina," *J. Geophys. Res.* **97**, 17353.

- 
- Carrigan, C. R., G. Schubert, and J. C. Eichelberger (1992), "Thermal and Dynamical Regimes of Single and Two-Phase Magmatic Flow in Dikes," *J. Geophys. Res.* **97**, 17377.
- Constable, S., T. J. Shankland, and A. Duba (1992), "The Electrical Conductivity of an Isotropic Olivine Mantle," *J. Geophys. Res.* **97**, 3397.
- Cynn, H., S. K. Sharma, T. F. Cooney, and M. Nicol (1992), "High-Temperature Raman Investigation of Order-Disorder Behavior in  $\text{MgAl}_2\text{O}_4$  Spinel," *Phys. Rev. B* **45**, 500.
- Duba, A. G. (1992), "Geophysics: Earth's Core Not so Hot," *Nature* **359**, 197.
- Duba, A. G., and S. Constable (1992), "Comparison of Electrical Conductivity of Single Crystal Olivine, Dunite, and Lherzolite," (submitted).
- Duong, H., M. Beeman, and J. Wolfenstine (1992), "Creep of KCl-KBr Solid Solution Alloys," *J. Mater. Sci. Lett.* **11**, 238.
- Durham, W. B., S. H. Kirby, and L. A. Stern (in press), "Rheologies of Ice I: The Effect of Particulate Impurities and Initial Grain Size," *J. Geophys. Res.*
- Filippenko, A. V., M. W. Richmond, D. Branch, C. M. Gaskell, W. Herbst, C. H. Ford, R. R. Treffers, T. Matheson, L. C. Ho, A. Dey, W. L. W. Sargent, T. A. Small, and W. J. M. van Breugel (1992), "The Subluminous, Spectroscopically Peculiar Type Ia Supernova 1991bg in the Elliptical Galaxy NGC 4374," *Astron. J.* **104**, 1543.
- Freeman, W. L., B. F. Madore, S. L. Hawley, I. K. Horowitz, J. Mould, M. Navarrete, and S. Sallmen (1992), "New Cepheid Distances to Nearby Galaxies Based on BVRI CCD Photometry. III. NGC 300," *Astrophys. J.* **396**, 80.
- Fuller, G., R. Mayle, B. Meyer, and J. Wilson (1992), "Can a Closure Mass Neutrino Help Solve the Supernova Shock Reheating Problem?" *Astrophys. J.* **389**, 517.
- Gallant, Y., M. Hoshino, A. B. Langdon, J. Arons, and C. E. Max (1992), "Relativistic, Perpendicular Shocks in Electron-Positron Plasmas," *Astrophys. J.* **391**, 73.
- Goldstein, P., W. Walter, and G. Zandt (1992), "Upper-Mantle Structure beneath Central Eurasia Using a Source Array of Nuclear Explosions and Waveforms at Regional Distances," *J. Geophys. Res.* **97**, 14097.
- Goodman, C. D., M. B. Aufderheide, S. D. Bloom, and D. A. Resler (1992), "Comments on 'Is the Weak Axial-Vector Current Renormalized in Nuclei?'," *Phys. Rev. Lett.* **69**, 2445.
- Gratz, A. J., *et al.* (1992), "Shock Metamorphism of Quartz with Initial Temperatures—170°C to 1000°C," *Phys. Chem. Minerals* **19**, 267-288.
- Harrison, M., C. Wenji, P. H. Leloup, F. J. Ryerson, and P. Tapponnier (1992), "An Early Miocene Transition in Deformation Regime within the Red River Fault Zone, Yunnan, and its Significance for Indo-Asian Tectonics," *J. Geophys. Res.* **97**, 7159.
- Hawley, S. L., and G. H. Fisher (1992), "X-Ray-Heated Models of Stellar Flare Atmospheres: Theory and Comparison with Observations," *Astrophys. J. Suppl.* **81**, 885.
- Helfand, D. L., S. Zoonematkermani, R. H. Becker, and R. L. White (1992) "Compact Radio Sources near the Galactic Plane," *Astrophys. J. Suppl.* **80**, 211.
- Hoshino, M., J. Arons, Y. Gallant, and A. B. Langdon (1992), "Relativistic Magnetosonic Shock Waves in Synchrotron Sources: Shock Structure and Non-Thermal Acceleration of Positrons," *Astrophys. J.* **390**, 454.
- Kawano, L. H., G. M. Fuller, R. A. Malaney, and M. J. Savage (1992), "Limits on Magnetic Moments of Heavy Neutrons from Nucleosynthesis," *Phys. Lett. B* **275**, 487.
- Keto, E., R. Ball, J. Arens, G. Jernigan, and M. Meixner (1992), "Characterization of Solid-State Array Cameras for the Mid-IR," *Int. J. Infrared Millimeter Waves* **13**, 1709.
-

- Keto, E., R. Ball, J. Arens, G. Jernigan, and M. Meixner (1992), "Mid-Infrared Imaging of Markarian 231 and Arp 220," *Astrophys. J. Lett* **387**, L17.
- Keto, E., R. Ball, J. Arens, G. Jernigan, and M. Meixner (1992), "Subarcsecond Mid-Infrared Imaging of the Nuclei of the Infrared Bright Galaxies NGC 1614 and NGC 7469," *Astrophys. J.* **389**, 223.
- Keto, E., D. Proctor, R. Ball, J. Arens, and G. Jernigan (1992), "The Environments of Young Stars: Mid-Infrared and Molecular Line Imaging," *Astrophys. J. Lett.* **401**, L113.
- Kirby, S. K., W. B. Durham, and L. A. Stern (1992), "The Ice I  $\rightarrow$  II Transition: Mechanics and Kinetics under Hydrostatic and Nonhydrostatic Conditions," in *Physics and Chemistry of Ice*, N. Maeno and T. Hondoh, Eds. (Sapporo, Japan), p.456.
- Kohn, M. J., D. L. Orange, F. S. Spear, D. R. Rumble III, and T. M. Harrison (1992), "Pressure, Temperature, and Structural Evolution of West-Central New Hampshire: Hot Thrusts over Cold Basement," *J. Petrol.* **33**, 521–556.
- Li, X., L. C. Ming, M. H. Manghnani, Y. Wang, and R. Jeanloz (1992), "Pressure Dependence of the Electrical Conductivity of  $\text{Mg}_0\text{Fe}_{0.1}\text{SiO}_3$  Perovskite," *J. Geophys. Res.* (submitted).
- Liedahl, D. A., S. M. Kahn, A. L. Osterheld, and W. H. Goldstein (1992), "X-Ray Emission-Line Spectra of Photoionized Plasmas: Density Sensitivity of the Fe L-Shell Series," *Astrophys. J.* **391**, 306.
- Lindley, G., and R. Archuleta (1992), "Earthquake Source Parameters and the Frequency Dependence of Attenuation at Coalinga, Mammoth Lakes, and the Santa Cruz Mountains, California," *J. Geophys. Res.* **97**, 14137.
- Mathews, G. J., G. Bazan, and J. J. Cowan (1992), "Evolution of Heavy-Element Abundances as a Constraint on Sites for Neutron-Capture Nucleosynthesis," *Astrophys. J.* **391**, 719.
- McKittrick, J., B. Tunaboylu, J. D. Katz, and W. Nellis (1992), " $\text{Al}_2\text{O}_3$ - $\text{ZrO}_2$  Ceramics with Submicron Microstructures Obtained through Microwave Sintering, Plasma Sintering, and Shock Compaction," *Mater. Res. Soc.* **274**, 149.
- McNamara, D. E., T. J. Owens, P. G. Silver, F. T. Wu, G. E. Randall, and R. S. Zheng (1992), "Shear Wave Anisotropy beneath the Tibetan Plateau," *EOS Trans. AGU* **93**, 205.
- Meyer, B. S., G. J. Mathews, W. M. Howard, S. E. Woosley, and R. D. Hoffman (1992), "r-Process Nucleosynthesis in the High-Entropy Supernova Bubble," *Astrophys. J.* **399**, 656.
- Miley, G. K., K. C. Chambers, W. J. M. van Breugel, and F. Macchetto (1992), "Hubble Space Telescope Imaging of Distant Galaxies: 4C 41.17 at  $z=3.8$ ," *Astrophys. J. Lett.* **401**, L69.
- Moran, E. C., J. P. Halpern, G. D. Bothun, and R. H. Becker (1992), "Was 49: Mirror for a Hidden Seyfert 1 Nucleus?" *Astron. J.* **104**, 990.
- Nellis, W. J., A. C. Mitchell, P. C. McCandless, D. Erskine, and S. T. Weir (1992), "Electronic Energy Gap of Molecular Hydrogen from Electrical Conductivity Measurements at High Shock Pressures," *Phys. Rev. Lett* **68**, 2937.
- Nimz, G. J., D. K. Smith, M. W. Caffee, R. C. Finkel, G. B. Hudson, J. W. Borchers, and K. P. Nimz (1992), "Isotopic Characterization of Hydrologic Structure and Chemical Interaction Between Groundwater and Granitic Rock in the Wawona Basin, Yosemite National Park," *EOS* **73**, 170.
- Nishiizumi, K., J. R. Arnold, M. W. Caffee, R. C. Finkel, and J. Southon (1992), "Exposure History of Separated Phases from the Kapoetaa Meteorite" (abstract), *Lunar and Planet. Sci.* **XXIII**.
- Nishiizumi, K., J. R. Arnold, M. W. Caffee, R. C. Finkel, J. Southon, and R. C. Reedy (1992), "Cosmic Ray Exposure Histories of Lunar Meteorites Asuka 881757, Yamato 793169, and Calalong Creek," *The 17th Symposium on Antarctic Meteorites*, 129–132.
- Nishiizumi, K., J. R. Arnold, M. W. Caffee, R. C. Finkel, and J. Southon (1992), "Exposure Histories of Calalong Creek and LEW 88516 Meteorites," *Meteoritics* **27**, 269–270.

- 
- Nishiizumi, K., J. R. Arnold, M. W. Caffee, R. C. Finkel, J. Southon, D. E. Brownlee, and R. P. Harvey (1992), " $^{10}\text{Be}$  and  $^{26}\text{Al}$  in Individual Cosmic Spherules," *Meteoritics* **27**, 270.
- O'Dea, C. P., S. A. Baum, C. Stanghellini, A. Dey, W. van Breugel, S. Duestua, and E. P. Smith (1992), "Radio and Optical Observations of 0218+357: The Smallest Einstein Ring?" *Astron. J.* **104**, 1320.
- Olinger, C. T., J. Poths, K. Nishiizumi, C. P. Kohl, R. C. Finkel, M. W. Caffee, J. Southon, and I. Proctor (1992), "Attenuation Lengths of Cosmogenic Production of  $^{26}\text{Al}$ ,  $^{10}\text{Be}$  and  $^{21}\text{Ne}$  in Bandelier Tuff," *EOS* **73**, 185.
- Petterson, B. R., S. L. Hawley, and G. H. Fisher (1992), "Starspots: The Zebra Effect," *Solar Phys.* **142**, 197.
- Seidl, M. A., and W. E. Dietrich (1992), "The Problem of Channel Erosion into Bedrock," in *Functional Geomorphology Landform Analysis and Models, Catena Suppl.*, K. H. Schmidt and J. de Ploey, Eds., **23**, p. 101.
- Seidl, M. A., W. E. Dietrich, J. W. Kirchner, M. W. Caffee, R. C. Finkel, and G. B. Hudson (1992), "Stream Power Dependent Erosion of Bedrock Channels: Field Observations and Model Results," *EOS* **73**, 212.
- Skinner, C. J., A. G. G. M. Tielens, M. J. Barlow, and K. Justtanont (1992), "Methanol Ice in the Protostar GL 2136," *Astrophys. J. Lett.* **399**, L79.
- Tavani, M. (1992), "Pulsar-Irradiated Stars in Dense Globular Cluster," *Astron. Astrophys.* **261**, 472.
- Tavani, M., and L. Brookshaw (1992), "Planetary Systems around Millisecond Pulsars," *Nature* **356**, 320.
- Tolbert, S. H., A. P. Alivisatos, H. E. Lorenzana, M. B. Kruger, and R. Jeanloz (1992), "Raman Studies on  $\text{C}_{60}$  at High Pressures and Low Temperatures," *Chem. Phys. Lett.* **188**, 163.
- van Breugel, W. J. M., and A. Dey (1992), "Induced Star Formation in a Radio Lobe of 3C 285," *Astrophys. J. Lett.* (submitted).
- van Breugel, W. J. M., C. Fanti, R. Fanti, C. Stanghellini, R. T. Schilizzi, and R. E. Spencer (1992), "Compact Steep-Spectrum 3 CR Sources: VLA Observations at 1.5, 15, and 22.5 GHz," *Astron. Astrophys.* **256**, 56.
- Vidale, J., and H. M. Benz (1992), "Upper-Mantle Seismic Discontinuities and the Thermal Structure of Subduction Zones," *Nature* **356**, 678.
- White, R., and R. Becker (1992), "A New Catalog of 30,239 1.4-GHz Sources," *Astrophys. J.* **388**, 220.
- White, R., and R. Becker (1992), "Compact Radio Sources near the Galactic Plane," *Astrophys. J.* **388**, 221.
- Woosley, S. E., and R. D. Hoffman (1992), "The  $\alpha$ -Process and the Y-Process," *Astrophys. J.* **395**, 202.
-

# 1993

- Alcock, C. R., C. W. Akerlof, R. A. Allsman, T. S. Axelrod, D. P. Bennett, S. Chan, K. H. Cook, K. C. Freeman, K. Griest, S. L. Marshall, H. S. Park, S. Perlmutter, B. A. Peterson, M. R. Pratt, P. J. Quinn, A. W. Rodgers, C. W. Stubbs, and W. Sutherland (1993), "Possible Gravitational Microlensing of a Star in the Large Magellanic Cloud," *Nature* **365**, 621.
- Akers, W. T., M. Grove, M. Harrison, and F. J. Ryerson (1993), "The Instability of Rhabdophane and its Unimportance in Monazite Petrogenesis," *Chem. Geol.* **110**, 147–168.
- Ammon, C., and G. Zandt (1993), "Receiver Structure beneath the Southern Mojave Block, California," *Bull. Seismol. Soc. Am.* **83**, 737–755.
- Anderson, O. (1993), *Physics of Iron*, Lawrence Livermore National Laboratory, Livermore, CA, UCRL-CONF-930676.
- Arnold, J. R., C. P. Kohl, Nishiizumi, K., M. W. Caffee, R. C. Finkel, and J. Southon (1993), "Measurements of Cosmogenic Nuclides in Lunar Rock 64455" (abstract), *Lunar and Planet. Sci.* **XXIV**.
- Arons, J. (1993), "Magnetic Field Topology in Pulsars," *Astrophys. J.* **408**, 160.
- Arons, J., and I. R. King (1993), "A Reprocessing Model for the Ultraviolet and Optical Light from 4U 1820-30," *Astrophys. J.* **413**, L121.
- Arons, J., and M. Tavani (1993), "High-Energy Emission from the Eclipsing Millisecond Pulsar PSR 1957+ 20," *Astrophys. J.* **403**, 249.
- Aufderheide, M. (1993), "Convection and Neutrino Emission in the Late Stages of Massive Star Evolution," *Astrophys. J.* **411**, 813.
- Baker, G. E., L. J. Burdick, and J. B. Minster (1993), "Regional Broadband Waveforms: Individual Station and Three-Component Array Analysis of Nuclear Explosion Sources Crossing a Southern California Path," in *Proc. 15th Ann. Seis. Res. Symp.*
- Bazan, G., and J. C. Lattanzio (1993), "Energy Generation in Convective Shells of Low-Mass, Low-Metallicity Asymptotic Giant Branch Stars," *Astrophys. J.* **409**, 762.
- Bennett, D. P., and S. H. Rhie (1993), "COBE's Constraints on the Global Monopole and Texture Theories of Cosmic Structure Formation," *Astrophys. J. Lett.* **406**, L7.
- Bennett, K., H.-R. Wenk, C. S. Choi, and S. F. Trevino (1993), "Texture Development in Deformed Polycrystalline Ice, II: A Study by Neutron Diffraction," in *Textures of Geological Materials*, H.-J. Bunge and K. Weber, eds., *Ger. Soc. Mat. Sci.* (submitted).
- Bennett, K., H.-R. Wenk, W. B. Durham, S. K. Kirby, and L. A. Stern (1993), "Preferred Crystallographic Orientation in Polycrystalline Ice with Hard Particulates" (submitted).
- Bennett, K., H.-R. Wenk, W. B. Durham, S. H. Kirby, and L. A. Stern (1993), "Rheology and Preferred Orientation Development in Ice I with Dispersed Particulates and Ice II at Low-Temperature: Application to Plastic Anisotropy in the Icy Satellites," *EOS Trans. Am. Geophys. Union* (submitted).
- Benson, D. J. (1993), "An Analysis by Direct Numerical Simulation of the Effects of Particle Morphology on the Shock Compaction of Copper Powder," *Model. Sim. Mater. Sci. Eng.* (submitted).
- Benson, D. J. (1993), "The Calculation of the Shock Velocity–Velocity Relationship for a Copper Powder by Direct Numerical Simulation," *Wave Motion* (in press).



- 
- Benson, D. J., and W. J. Nellis (1993), "Dynamic Compaction of Copper Powder: Computation and Experiment," *Appl. Phys. Lett.* **65**, 418.
- Brookshaw, L., and M. Tavani (1993), "Wind-Driven Angular Momentum Loss in Binary Systems, I. Ballistic Case," *Astrophys. J.* **410**, 719.
- Carrigan, C. R. (1993), "Two-Component Magma Transport and the Origin of Composite Intrusions and Lava Flows," in *Magmatic Systems*, M. P. Ryan, Ed. (Academic Press).
- Chandramouli, M., G. Thomas, and W. J. Nellis (1993), "Shock Compaction of Fe-Nd-B," *J. Appl. Phys.* **73**(10), 6494-6496.
- Charlot, S., and M. Fall (1993), "Lyman-Alpha Emission from Galaxies," *Astrophys. J.* **415**, 580.
- Charlot, S., F. Ferrari, G. Mathews, and J. Silk (1993), "Truncated Initial Mass Function in Starburst Galaxies," *Astrophys. J. Lett.* **419**, L57.
- Chastel, Y. B., P. R. Dawson, H.-R. Wenk, and K. Bennett (1993), "Anisotropic Convection with Implications for the Upper Mantle," *J. Geophys. Res. B* **98**, 17757.
- DeLoach, T., M. Clough, and W. J. Nellis (1993), "Shock Amorphization of Cristobalite," *Science* **259**, 663.
- Duba, A., and S. Constable (1993), "The Electrical Conductivity of Lherzolite," *J. Geophys. Res.* **98**, 11885.
- Duong, H., M. Beeman, and J. Wolfenstine (1993), "Creep and Dislocation Substructure of KCl-KBr Solid Solution Alloys," *Acta Metall. Mater.* (submitted).
- Duong, H., M. Beeman, and J. Wolfenstine (1993), "Creep Behavior of Potassium Chloride-Rubidium Chloride Solid Solution Alloys," *J. Am. Ceram. Soc.* **76**, 185.
- Field, G. B., and R. D. Rogers (1993), "Radiation from Magnetized Accretion Disks in Active Galactic Nuclei," *Astrophys. J.* **403**, 94.
- Flegal, A. R., H. Maring, and S. Niemeyer (1993), "Anthropogenic Lead in Antarctic Sea Water," *Nature* **365**, 242.
- Florence, F. P., F. S. Spear, and M. J. Kohn (1993), "P-T Paths from Northwestern New Hampshire: Metamorphic Evidence for Stacking in a Thrust/Nappe Complex," *Am. J. Sci.* **293**, 939-979.
- Freim, J., J. McKittrick, and W. J. Nellis (1993), "Shock Compaction of Al/Zr Ceramics" presented at *Am. Phys. Soc. Meeting* (Colorado Springs, CO).
- Fuller, G. (1993), "The Curious Connection among Neutrino Masses, Mixings, and Heavy-Element Nucleosynthesis in Supernovae," presented at Massachusetts Institute of Technology (Cambridge, MA).
- Fuller, G. (1993), "The Curious Connection between Neutrino Dark Matter and r-Process Heavy-Element Nucleosynthesis in Supernovae," presented at University of Washington.
- Gentile, N., M. Aufderheide, G. Mathews, F. Swesty, and G. Fuller (1993), "The QCD Phase Transition and Supernova Core Collapse," *Astrophys. J.* **414**, 701.
- Graf, Th., K. Nishiizumi, R. C. Finkel, M. W. Caffee, J. Southon, S. Toe, B. Lavielle, E. Gilabert, and G. N. Simonoff (1993), "New Model Parameters for the Production of Cosmic-Ray-Produced Nuclides Derived from Measurements in Knyahinya," *Meteoritics* **28**, 356.
- Graham, J. R., T. M. Herbst, K. Matthews, G. Neugebauer, and B. T. Soifer (1993), "H<sub>2</sub> Morphology of Young Planetary Nebulae," *Astron. J. Lett.* **408**, L105.
- Graham, J. R., E. Serabyn, T. M. Herbst, K. Matthews, G. Neugebauer, B. T. Soifer, T. D. Wilson, and S. Beckwith (1993), "A Spatially Resolved Photodissociation Region in the Planetary Nebula NGC 7027," *Astrophys. J.* **105**, 250.
-

- Gratz, A. J., L. D. DeLoach, T. M. Clough, and W. J. Nellis (1993), "Shock Amorphization Of Cristobalite," *Science* **259**, 663–666.
- Gratz, A., W. Nellis, and N. Hinsey (1993), "Observations of High-Velocity, Weakly Shocked Ejecta from Experimental Impacts," *Nature* **363**, 522–524.
- Gurrola, H. G., E. Baker, and J. B. Minster (1993), "Simultaneous Time Domain Deconvolution with Application to Receiver Functions," *Geophys. J. Int.* (submitted).
- Hirsch, L. M., and T. J. Shankland (1993), "Quantitative Olivine-Defect Chemical Model: Insight on Electrical Conduction, Diffusion, and the Role of Fe Content," *Geophys. J. Int.* **114**, 21.
- Hirsch, L. M., T. J. Shankland, and A. G. Duba (1993), "Electrical Conduction and Polaron Mobility in Fe-Bearing Olivine," *Geophys. J. Int.* **114**, 36.
- Hubert, A., and S. Schwartz (1993), "State of Stress at the Cape Mendocino Triple Junction from Inversion of Focal Mechanisms of the 1992 Petrolia, CA, Earthquake Sequence," *Trans. Am. Geophys. Union* **74**, 200.
- Jedamzik K., G. M. Fuller, G. J. Mathews, and T. Kajino (1993), "Enhanced Heavy Element Formation in Baryon-Inhomogeneous Big Bang Model," *Astrophys. J.* **422**, 423.
- Kagan, Y. Y. (1993), "Distribution of Incremental Static Stress Caused by Earthquakes," *Nonlinear Processes Geophys.* (submitted).
- Kagan, Y. Y. (1993), "Observational Evidence for Earthquakes as a Nonlinear Dynamic Process" *Physica D* (submitted).
- Keto, E., R. Ball, J. Arens, G. Jernigan, M. Meixner, C. Skinner, and J. Graham (1993), "The Mid-Infrared Radio Correction at High Angular Resolution: NGC 253," *Astrophys. J. Lett.* **413**, L23.
- Kohn, M. J. (1993), "Uncertainties in Differential Thermodynamic (Gibbs Method) P–T Paths," *Contrib. Mineral. Petrol.* **113**, 24–39.
- Kohn, M. J. (1993), "Modeling of Prograde Mineral  $\delta^{18}\text{O}$  Changes in Metamorphic Systems," *Contrib. Mineral. Petrol.* **113**, 249–261.
- Kohn, M. J. and F. S. Spear (1993), "Phase Equilibria of Margarite-Bearing Schists and Chloritoid+Hornblende Rocks from Western New Hampshire," *J. Petrol.* **34**, 631–651.
- Kohn, M. J., F. S. Spear, and I. W. D. Dalziel (1993), "Metamorphic P–T Paths from Cordillera Darwin, a Core Complex in Tierra del Fuego, Chile," *J. Petrol.* **34**, 519–542.
- Kohn, M. J., J. W. Valley, D. Elsenheimer, and M. J. Spicuzza (1993), "Oxygen Isotope Zoning in Garnet and Staurolite: Evidence for Closed System Mineral Growth during Regional Metamorphism," *Am. Mineral.* **78**, 988–1001.
- Leloup, P. H., T. M. Harrison, F. J. Ryerson, C. Wenji, L. Qi, P. Tapponnier, and R. Lacassin (1993), "Structural, Petrological and Thermal Evolution of a Tertiary Ductile Strike-Slip Shear Zone, Diancang Shan, Yunnan," *J. Geophys. Res.* **98**, 6715–6744.
- Maheshwari, A., and A. Ardell (1993), "Morphological Evolution of Coherent Misfitting Precipitates in Anisotropic Elastic Media," *Phys. Rev. Lett.* **70**, 2305.
- Mangino, S. G., G. Zandt, and C. J. Ammon (1993), "The Receiver Structure beneath Mina, Nevada," *Bull. Seismol. Soc. Am.* **83**, 542.
- Mathews, G. J., R. Boyd, and G. M. Fuller (1993), "Chemical Evolution of Irregular Galaxies and the Primordial of  $^4\text{He}$  Abundance," *Astrophys. J.* (in press).
- Mayle, R., M. Tavani, and J. Wilson (1993), "Pions, Supernovae, and the Supranuclear Matter Density Equation of State," *Astrophys. J.* **418**, 398.

- 
- McNamara, D. E., and T. J. Owens (1993), "Azimuthal Shear Wave Velocity Anisotropy in the Basin and Range Province Using Moho Ps Converted Phases," *J. Geophys. Res.* **98**, 12,003-12,017.
- McNamara, D. E., T. J. Owens, G. E. Randall, and F. T. Wu (1993), "Local and Regional Earthquake Travel Times within the Tibetan Plateau," *EOS Trans. AGU* **74**, 202.
- McNamara, D. E., W. R. Walter, T. J. Owens, G. E. Randall, and G. Zandt (1993), "Upper Mantle Velocity Structure Determined from Regional Earthquakes Recorded within the Tibetan Plateau," *EOS Trans. AGU* **74**, 425.
- Meixner, M. (1993), *A Mid-IR Imaging and Millimeter Interferometer Study of Evolved Stars: Filling in the Missing Link of Planetary Nebula Formation*, Ph.D. thesis, University of California, Berkeley.
- Meixner, M., and A. G. G. M. Tielens (1993), "Models of Clumpy Photodissociation Regions," *Astrophys. J.* **405**, 216.
- Meixner, M., C. Skinner, P. Temi, D. Rank, J. Bregman, J. R. Ball, E. Keto, J. Arens, and J. G. Jernigan (1993), "2-12.5 Micron Imaging of IRAS 21282+ 5050: The Structure of a Young Planetary Nebula," *Astrophys. J.* **411**, 266.
- Nicol, M., T. F. Cooney, H. Cynn, A. Koumvakalis, S. K. Sharma, and J. Yen (1993), "Spectral, Chemical and Phase Changes at High P and T: Recent Results for  $\text{NH}_3\text{H}_2\text{O}$ , Ruby, and  $\text{MgAl}_2\text{O}_4$  Spinel," in *Proc. 13th AIRAPT Conf: High Pressure Research and Technology*, A. K. Singh, Ed. (Oxford and IBH Publishing, New Delhi), p. 223.
- Nellis, W. J., and A. J. Gratz (1993), "Recovery of Materials Impacted at High Velocity," *Int. J. Impact Eng.* **14**(1-4), 531-539.
- Nimz, G., K. Cameron, and S. Niemeyer (1993), "The La Olivina Pyroxenite Suite and the Isotopic Compositions of Mantle Basalts Parental to the Mid-Cenozoic Arc Volcanism of Northern Mexico," *J. Geophys. Res.* **98**, 6489.
- Nishiizumi, K., J. R. Arnold, M. W. Caffee, R. C. Finkel, J. Southon, H. Nagai, M. Honda, and M. Imamura (1993), "Exposure Ages of Carbonaceous Chondrites—I." (abstract), *Lunar and Planet. Sci.* **XXIV**.
- Nishiizumi, K., C. P. Kohl, R. Dorn, J. Klein, D. Fink, R. Middleton, D. Lal, and J. R. Arnold (1993), "Role of In-Situ Cosmogenic Nuclides  $^{10}\text{Be}$  and  $^{26}\text{Al}$  in the Study of Diverse Geomorphic Processes," *Earth Surface Processes Landform* **18**, 407.
- Olivier, S., C. E. Max, D. T. Gavel, and J. M. Brase (1993), "Tip-Tilt Compensation: Resolution Limits for Ground-Based Telescopes Using Laser Guide Star Adaptive Optics," *Astrophys. J.* **407**, 428.
- Olivier, S., J. Primack, G. Blumenthal, and A. Dekel (1993), "Significant Cluster Correlations at  $30 \text{ h}^{-1} \text{ Mpc}$ : Can Standard Models Be Ruled Out?" *Astrophys. J.* **408**, 17.
- Owens, T. J., G. E. Randall, D. E. McNamara, and F. T. Wu (1993), *Data Report for the 1991-92 Tibetan Plateau Passive-Source Seismic Experiment*, PASSCAL Data Rep. #93-005, IRIS, Wash. DC.
- Owens, T. J., F. T. Wu, D. E. McNamara, and G. E. Randall (1993), "Variations of Teleseismic P and S-Wave Travel Times within the Tibetan Plateau," *EOS Trans. AGU* **74**, 202.
- Protti, M., S. Y. Schwartz, and G. Zandt (1993), "Simultaneous Inversion for Earthquake Locations and Velocity Structure under Central Costa Rica from Local Network Data," *Seismol. Res. Lett.* **64**, 14.
- Protti, M., S. Y. Schwartz, and G. Zandt (1993), "Subduction-Related High- and Low-Velocity Anomalies beneath Central Costa Rica: Results from Simultaneous Inversion for Earthquake Locations and Velocity Structure," *EOS Trans. Am. Geophys. Union* **74**, 420.
- Qian, Y.-Z., G. M. Fuller, G. J. Mathews, R. W. Mayle, J. R. Wilson, and S. E. Woosley (1993), "Connection between Flavor Mixing of Cosmologically Significant Neutrinos and Heavy-Element Nucleosynthesis in Supernovae," *Phys. Rev. Lett.* **71**, 1965.
- Reedy, R. C., J. Masarik, K. Nishiizumi, J. R. Arnold, M. W. Caffee, R. C. Finkel, J. Southon, A. T. J. Jull, and D. J. Donohue (1993), "Cosmogenic-Radionuclide Profiles in Knyahinya: New Measurements and Models 3" (abstract), *Lunar and Planet. Sci.* **XXIV**.
-

- 
- Rundle, J. (1993), "Magnitude-Frequency Relations for Earthquakes Using a Statistical Mechanical Approach," *J. Geophys. Res.* **98**, 21943.
- Schwartz, S. Y. (1993), "Source Parameters of Local Earthquakes from Inversion of P- and S-Wave Amplitudes," *Trans. Am. Geophys. Union* **74**, 399.
- Schwartz, S., and T. Lay (1993), "Complete PP-Waveform Modeling for Determining Crust and Upper-Mantle Structure," *Geophys. J. Int.* **112**, 210.
- Seidl, M. A., W. E. Dietrich, and J. W. Kirchner, (1993), "Longitudinal Profile Development into Bedrock: An Analysis of Hawaiian Channels," *J. Geology* **102**, 457–474.
- Seidl, M. A. (1993), *Form and Process in Channel Incision of Bedrock*, unpublished Ph.D. thesis, University of California, Berkeley.
- Smith, A. (1993), "Discrimination of Explosions from Simultaneous Mining Blasts," *Bull. Seismol. Soc. Am.* **83**, 160.
- Spinrad, H., A. Dey, M. Yates, M. Dickinson, and W. van Breugel (1993), "3C 364: A Steep-Spectrum Radio Galaxy at  $z=0.92$ ," *Astron. J.* **106**, 6.
- Steck, L., and W. Prothero, Jr. (1993), "Observations of Direct P-Wave Slowness and Azimuth Anomalies for Teleseisms Recorded in Long Valley Caldera, California," *Bull. Seismol. Soc. Am.* **83**, 1391.
- Tavani, M., and L. Brookshaw (1993), "Hidden Slow Pulsars in Binaries," *Astrophys. J.* **413**, L39.
- Tavani, M., and L. Brookshaw (1993), "Modeling Time Variable and Total Eclipses of the Millisecond Pulsar PSR 1744–24A," *Astron. Astrophys.* **261**, L1.
- Tavani, M., and R. London (1993), "Hydrodynamics of Winds from Irradiated Companion Stars in Low-Mass X-Ray Binaries," *Astrophys. J.* **410**, 281.
- Tunaboylu, B., J. McKittrick, and W. J. Nellis (1993), "Shock Compaction of  $\text{Al}_2\text{O}_3$ – $\text{ZrO}_2$  Compositions," *J. Am. Ceram. Soc.* (in press).
- van Breugel, W., and A. Dey (1993), "Induced Star Formation in a Radio Lobe of 3C 285?," *Astrophys. J.* **414**, 563.
- Verdonck, D., and G. Zandt (1993), "Three-Dimensional Crustal Structure of the Mendocino Triple Junction Region from Local Earthquake Travel Times," *J. Geophys. Res. Solid Earth* **99**(12), 23843–23858.
- Vidale, J., and S. Houston (1993), "The Depth Dependence of Earthquake Duration and Implications for Rupture Mechanisms," *Nature* **365**, 45.
- Warren, P. H., A. E. Rubin, J. T. Wasson, A. J. Gratz, W. J. Nellis, and N. H. Hinsey (1993), "Experimental Shock of Loess and a Compositionally Analogous Siltstone: Implications for the Origin of Tektites," *EOS Trans. Am. Geophys. Union* **74**, 390.
- Warren, J. K., J. V. Vallerger, C. W. Mauche, K. Mukai, and O. H. W. Siegmund (1993), "EUVE Observations of UZ Fornacis and AM Herculis," in *Proc. 105th Meeting ASP* (in press).
- Warren, J. K., J. V. Vallerger, C. W. Mauche, K. Mukai, and O. H. W. Siegmund (1993), "Extreme Ultraviolet Explorer Observations of the Magnetic Cataclysmic Variable RE 1938–461," *Astrophys. J. Lett.* **414**, L69.
- White, R. L., A. L. Kinney, and R. H. Becker (1993), "New High Redshift Damped Lyman-Alpha Absorption Systems and the Redshift Evolution of Damped Absorbers," *Astrophys. J.* **407**, 456.
- Wolfenstine, J. (1993), "Creep and Dislocation Substructure Formation in Ceramic Solid-Solution Alloys," in *Creep and Fracture of Engineering Materials and Structures*, B. Wilshire and R. W. Evans, Eds. (Institute of Materials, London), p. 335.
- Yoo, C. S., N. C. Holmes, M. Ross, D. J. Webb, and C. Pike (1993), "Shock Temperatures and Melting of Iron at Earth Core Conditions," *Phys. Rev. Lett.* **70**, 3931.
- Zandt, G., and C. R. Carrigan (1993), Small-Scale Convective Instability and Upper Mantle Viscosity under California," *Science* **261**, 460–463.
-

# 1994

- Arons, J., and M. Tavani (1994), "Relativistic Particle Acceleration in Plerions," *Astrophys. J. Suppl.* **90**, 797.
- Aufderheide, M., I. Fushiki, G. Fuller, and T. Weaver (1994), "A New URCA Process," *Astrophys. J.* **424**, 257.
- Aufderheide, M., I. Fushiki, S. Woosley, and D. Hartmann (1994), "Search for Important Weak Interaction Nuclei in Presupernova Evolution," *Astrophys. J. Suppl.* **91**, 389.
- Beck, S., *et al.* (1994). "Across the Andes and along the Altiplano: A Passive Seismic Experiment," *IRIS Newsletter*, **XII**(3), pp. 1–3.
- Becker, R., R. White, D. Helfand, and S. Zoonematkermani (1994). "A 5-GHz VLA Survey of the Galactic Plane," *Astrophys. J. Suppl.* **91**, 347.
- Beckers, J., S. Y. Schwartz, and T. Lay (1994), "The Velocity Structure of the Crust and Upper Mantle under China from Broad-Band P and PP Waveform Analysis," *Geophys. J. Int.* **119**(2), 574.
- Benson, D. J., and W. J. Nellis (1994), "Dynamic Compaction of Copper Powder—Computation and Experiment," *Appl. Phys. Lett.* **65**(4), 418–420.
- Brenan, J. M., H. F. Shaw, D. L. Phinney, and F. J. Ryerson (1994), "Chemical Fractionation during Slab Dehydration and Recycling: Constraints From Mineral-Fluid Partitioning Experiments," *EOS Trans. Am. Geophys. Union* **75**, 723.
- Brenan, J. M., H. F. Shaw, D. L. Phinney, and F. J. Ryerson (1994), "Rutile-Fluid Partitioning of Nb, Ta, Hf, Zr, U, and Th: Implications for High-Field-Strength Element Depletions in Island-Arc Basalts," *Earth Planet. Sci. Lett.* **128**, 327–339.
- Brenan, J. M., H. F. Shaw, and D. L. Phinney (1994), "Experimental Determination of Trace Element Partitioning between Pargasitic Amphibole and Hydrous Silicate Melt," V. M. Goldschmidt Conference, Edinburgh, UK.
- Brenan, J. M., H. F. Shaw, D. L. Phinney, and F. J. Ryerson (1994), "Mineral-Fluid Partitioning of Trace Elements: Implications for Subduction-Zone Fluids," Invited Keynote Address, *5th Int. Symp. on Expt. Mineral., Petrol., and Geochem.*, London, U.K.
- Caffee, M. W., R. C. Finkel, I. Lucchitta, S. Davis, and M. Davis (1994), "Investigation of the Quaternary History of the Colorado River," *EOS* **75**, 273.
- Charlot, S. and J. Silk (1994) "Evolution of Galaxies in Clusters," *Astrophys. J.* **432**, 453.
- Cordier, P., A. A. Gratz, J. C. Doukhan, and W. J. Nellis (1994), "Microstructures of  $\text{Al}_2\text{O}_3$  Subjected to High Shock Pressures," *Phys. Chem. Minerals* **21**(3), 133–139.
- Dey, A., and W. van Breugel (1994), "Blue Optical Continuum Emission Associated with a Radio Knot in 3C34C," *Astrophys. J.* (submitted).
- Dibb, J. E., L. A. Barrie, R. C. Finkel, J. Southon, and M. C. Caffee (1994), "Estimation of Stratospheric Input to the Arctic Troposphere:  $^7\text{Be}$  and  $^{10}\text{Be}$  in Aerosols at Alert, Canada," *J. Geophys. Res.* **99**, 12,855–12,864.
- Erskine, D., W. J. Nellis, and S. T. Weir (1994), "Shock Wave Profile Study of Tuff from the Nevada Test Site," *J. Geophys. Res. Solid Earth* **99**(8), 15529–15537.
- Erskine, D., W. Nellis, and S. Weir (1994), "Shock Wave Profile Study of Tuff from the Nevada Test Site," *J. Geophys. Res.* **99**, 15529.
- Farber, D., Q. Williams, and R. Ryerson (1994), "Diffusion in  $\text{Mg}_2\text{SiO}_4$  Polymorphs and Chemical Heterogeneity in the Mantle Transition Zone," *Nature* **371**, 693.

- Freim, J., J. McKittrick, and W. J. Nellis (1994), "Structure Ceramics Produced through Post-Sintering of Dynamically Compacted Powder," presented at *5th Int. Symp. Ceramic Materials and Components for Engines* (Shanghai, China).
- Freim, J., J. McKittrick, W. J. Nellis, and J. D. Katz (1994), "Improved Zirconia Toughened Alumina (ZTA) Microstructures Obtained through Rapid Solidification and Shock Compaction," *J. Mater. Res.* (submitted).
- Fuller, G. M., and B. S. Meyer (1994), "Neutrino Capture and Supernova Nucleosynthesis" (submitted).
- Fuller, G. (1994), "Constraining Weak Interaction Physics and Neutrino Properties with Astrophysical Considerations," presented at the Snowmass Workshop.
- Fuller, G. M., K. Jedamzik, G. J. Mathews, and A. Olinto (1994), "On Constraining Electroweak-Baryogenesis with Inhomogeneous Primordial Nucleosynthesis," *Phys. Lett. B* **333**, 135.
- Gallant, Y., and J. Arons (1994), "Structure of Relativistic Shocks in Pulsar Winds: A Model of the WISPs in the Crab Nebula," *Astrophys. J.* **435**, 230.
- Ghez, A. M., J. P. Emerson, J. R. Graham, M. Meixner, and C. J. Skinner (1994), "10-Micron Imaging of Uz Tauri: Evidence for Circumstellar Disk Clearing due to a Close Companion Star," *Astrophys. J.* **434**, 707.
- Gregg, M. (1994), "Spectrophotometry of Early Type Systems. I. A Metallicity Sequence of Globular Clusters," *Astron. J.* **108**, 2164.
- Hawley, S., and G. Fisher (1994), "Solar Flare Model Atmospheres," *Astrophys. J.* **426**, 387.
- Helfand, D. J., R. H. Becker, G. Hawkins, and R. L. White (1994), "The Nature of the Compact X-Ray Source in the Supernova Remnant G27.4+00," *Astrophys. J.* **434**, 627.
- Hoffman, R. (1994), "Gamma-Ray Radioactivities from Supernova Explosion," presented at the Gamma-Ray Sky with CGRO and Sigma Conf. (Les Houches, France).
- Hoffman, R. (1994), "The r-Process and Neutrino-Heated Supernova Ejecta," presented at Conf. Nuclei in the Cosmos (Gran Sasso, Italy).
- Hoffman, R., S. E. Woosley, T. Weaver, R. Eastman, F. Timmes, and D. Hartmann, (1994), "Gamma-Ray Producing Radioactivities from Supernova Explosion," in *Gamma-Ray Sky*, *Signore, Salati, and Vedrenne*, Eds. (Kluwer Academic Publishers).
- Hough, S. (1994), "Southern Surface Rupture Associated with the M7.3 1992 Landers, California, Earthquake," *Bull. Seis. Soc. Am.* **84**, 817.
- Jedamzik, K., and G. M. Fuller (1994), "Baryon Number Transport in a Cosmic QCD-Phase Transition" (submitted).
- Jedamzik, K., and G. M. Fuller, (1994), "The Evolution of Nonlinear Subhorizon-Scale Entropy Fluctuations in the Early Universe," *Astrophys. J.* **423**, 33.
- Jedamzik, K., G. M. Fuller, and G. J. Mathews (1994), "Inhomogeneous Primordial Nucleosynthesis: Coupled Nuclear Reactions and Hydrodynamic Dissipation Processes," *Astrophys. J.* **423**, 50.
- Jedamzik, K., G. M. Fuller, G. J. Mathews, and T. Kajino (1994), "Enhanced Heavy-Element Formation in Baryon-Inhomogeneous Big Bang Models," *Astrophys. J.* **422**, 423.
- Jiao, W., T. C. Wallace, S. L. Beck, P. G. Silver, and G. Zandt (1994), "Evidence for Static Displacements from the June 9, 1994, Deep Bolivian Earthquake," *Geophys. Res. Lett.* (submitted).
- Justanont, K., C. J. Skinner, and A. G. G. M. Tielens (1994), "Molecular Rotational Line Profiles from Oxygen-Rich Red Giant Winds," *Astrophys. J.* **435**, 852.
- Kagan, Y. Y., and D. D. Jackson, (1994), "Long-Term Probabilistic Forecasting of Earthquakes," *J. Geophys. Res.* **99**, 13685.

- 
- Kersting A. B., and R. J. Arculus (1994), "Klyuchevskoy Volcano, Kamchatka, Russia—The Role of High-Flux Recharged, Tapped, and Fractionated Magma Chamber(s) in the Genesis of High- $\text{Al}_2\text{O}_3$  from High-MgO Basalt," *J. Petrol.* **35**, 1-41.
- Klein, R., C. F. McKee, and P. Colella (1994), "On the Hydrodynamic Interaction of Shock Waves with Interstellar Clouds: I. Nonradiative Shocks in Small Clouds," *Astrophys. J.* **420**, 213.
- Kohn, M. J. and J. W. Valley (1994), "Oxygen Isotope Constraints on Metamorphic Fluid Flow, Townshend Dam, Vermont, USA," *Geochim. Cosmochim. Acta* **58**, 5551-5566.
- Kramer, M. J., R. W. McCallum, W. J. Nellis, and U. Balachandran (1994), "Effects of Shock-Induced Defect Density on Flux Pinning in Melt-Textured  $\text{YBa}_2\text{Cu}_3\text{O}_{7-\delta}$ ," *J. Electron. Mater.* **23**, 1111-1115.
- Kramer, M. J., R. W. McCallum, W. J. Nellis, and U. Balachandran (1994), "Effects of Shock-Induced Defects and Subsequent Heat Treatment on Flux Pinning in Melt-Textured  $\text{YBa}_2\text{Cu}_3\text{O}_{7-\delta}$ ," *Physica C* **228**(3-4), 265-278.
- Lehnert, M., and T. Heckman (1994), "Emission-Line Ratios of the Integrated Spectra of Galaxies: Evidence for a Diffuse Ionized Medium in Other Galaxies?," *Astrophys. J. Lett.* **426**, L27.
- Lundstrom, C. C., H. F. Shaw, D. L. Phinney, F. J. Ryerson, J. B. Gill, and Q. Williams (1994), "New U-Th-Ba Partition Coefficients between Chromian Diopside and Haplobasaltic Melts," *Earth Planet. Sci. Lett.* **128**, 407-423.
- Max, C. E., D. T. Gavel, S. S. Olivier, J. M. Brase, H. W. Friedman, K. Avicola, J. T. Salmon, A. D. Gleckler, T. S. Mast, J. E. Nelson, P. L. Wizinowich, and G. A. Chanan (1994), "Issues in the Design and Optimization of Adaptive Optics and Laser Guide Stars for the Keck Telescopes," *SPIE* **2201**, 189.
- McKean, J. A., W. R. Dietrich, R. C. Finkel, J. R. Southon, I. D. Proctor, and M. W. Caffee (1994), "Quantification of Soil Production and Downslope Creep Rates from Cosmogenic  $^{10}\text{Be}$  Accumulations on a Hillslope Profile," *Geology* **21**, 343-346.
- McNamara, D. E. (1994), "Structure of the Continental Lithosphere from Analysis of Regional and Teleseismic Data: Implications for the Tectonic Evolution of the Tibetan Plateau," *2nd Workshop of the International Lithosphere Program*, 7-9 June, Montpellier, FR.
- McNamara, D. E., T. J. Owens, W. R. Walter, and H. Benz (1994), "Propagation of Lg within the Tibetan Plateau," *Seismol. Res. Lett.* **65**.
- McNamara, D. E., T. J. Owens, F. T. Wu, and P. G. Silver (1994), "Shear Wave Anisotropy beneath the Tibetan Plateau," *J. Geophys. Res.* **99**, 13,655-13,655.
- McNamara, D. E., W. R. Walter, T. J. Owens, and C. J. Ammon (1994), "Upper Mantle Velocity Structure beneath the Tibetan Plateau Determined from Pn Travel Time Tomography," *EOS Trans. AGU* **75**, 423.
- Minarik, W. G. and J. M. Brennan (1994), "Connectivity of Volatile-Rich Melts in Mantle Source-Regions: Constraints from Fe-Transport Experiments" (invited), V. M. Goldschmidt Conference, Edinburgh, UK.
- Myers, S. C., T. C. Wallace, S. L. Beck, P. G. Silver, G. Zandt, J. Vandecar, and E. Minaya (1994), "Implications of Spatial and Temporal Development of the Aftershock Sequence for the  $M_w$  8.3 June 9, 1994, Deep Bolivian Earthquake," *Geophys. Res. Lett.* (submitted).
- Nishiizumi, K., M. W. Caffee, and R. C. Finkel (1994), "Exposure Histories of ALHA 84001 and ALHA 77005," *Meteoritics* **29**, 551.
- Nishiizumi, K., R. C. Finkel, M. W. Caffee, P. Sharma, J. Masarik, R. C. Reedy, and J. R. Arnold (1994), "Recent Histories of Lunar Cores 15009 and 72002/1 Using Cosmogenic Radionuclides  $^{10}\text{Be}$ ,  $^{26}\text{Al}$ , and  $^{36}\text{Cl}$ " (abstract), *Lunar and Planet. Sci.* **XXV**, 1003-1004.
- Qian, Y.-Z., and G. M. Fuller (1994), "Neutrino-Neutrino Scattering and Matter-Enhanced Neutrino Flavor Transformation in Supernovae" (submitted).
-

## Appendix C

---

- Qian, Y.-Z., and G. M. Fuller (1994), "Signature of Supernova Neutrino Flavor Mixing in Water Cerenkov Detectors," *Phys. Rev. D* **49**, 1762.
- Ryutova, M. P. (1994), "There is the Scientific Council and the Sednesday Seminar: That Will Do," *Physics Uspekhi* **37** 1227.
- Schuessler, B. K., S. L. Beck, G. Zandt, and T. C. Wallace (1994), "Crustal Thickness Variations in the Central Andes of South America Determined from Regional Waveform Modeling of Earthquakes," *Geophys. J. Int.* (submitted).
- Shaw, H. F., J. M. Brenan, D. L. Phinney, and F. J. Ryerson (1994), "Chemical and Isotopic Composition of Fluids in IAB Sources: Constraints from Mineral-Fluid Partitioning Experiments," Geological Society of America Annual Meeting, Seattle.
- Skinner, C. J. (1994), "Red Giants with Unusual Dust Shells—II. The Dusty R Star HD 100764," *Monthly Notices* **271**(2), 300.
- Skinner, C., M. Meixner, G. Hawkins, E. Keto, J. G. Jernigan, and J. Arens (1994), "Mid-Infrared Images of the Post-Asymptotic Giant Branch Star HD 161796," *Astrophys. J. Lett.* **423**, L135.
- Skulski, T., W. Minarik, and E. B. Watson (1994), "High-Pressure Experimental Trace Element Partitioning between Clinopyroxene and Basaltic Melts," *Chem. Geology* **117**, 127-149.
- Steck, L., and W. Prothero (1994), "Crustal Structure beneath Long Valley Caldera from Modeling of Teleseismic P Wave Polarizations," *J. Geophys. Res.* **99**, 6881.
- Sylvester, R., M. Barlow, and C. Skinner (1994), "Ultraviolet Band Emission from M Supergiants," *Mon. Not. R. Astron. Soc.* **266**, 640.
- Tinker, M. A., T. C. Wallace, S. L. Beck, P. G. Silver, and G. Zandt (1994), "Aftershock Source Mechanisms from the June 9, 1994, Deep Bolivian Earthquake," *Geophys. Res. Lett.* (submitted).
- Tunaboylu, B., J. McKittrick, W. J. Nellis and S. R. Nutt (1994), "Dynamic Compaction of Al<sub>2</sub>O<sub>3</sub>-ZrO<sub>2</sub> Compositions," *J. Am. Ceram. Soc.* **77**(6), 1605-1612.
- Verdonck, D., and G. Zandt (1994), "Three-Dimensional Crustal Structure of the Mendocino Triple Junction Region from Local Earthquake Travel Time," *J. Geophys. Res.* **99**, 23843.
- Wenk, H. R. (1994), "Texture Development during Deformation: New Results in Complex Systems," *Solid State Phenom.* **35-36**, 45.
- Woosley, S. E., J. R. Wilson, G. J. Mathews, R. D. Hoffman, and B. S. Meyer (1994), "The r-Process and Neutrino-Heated Supernova Ejecta," *Astrophys. J.* **433**, 229.
- Yin, A., T. M. Harrison, F. J. Ryerson, C. Wenji, W. S. F. Kidd, and P. Copeland (1994), "Tertiary Structural Evolution of the Gangdese Thrust System: Southeastern Tibet," *J. Geophys. Res.* **99**, 18175-18201.
- Zandt, G., A. A. Valasco, and S. L. Beck (1994), "Composition and Thickness of the Southern Altiplano Crust, Bolivia," *Geology* **22**(11), 1003-1006.
- Zandt, G., and C. J. Ammon (1994), "Continental Crust Composition Constrained by Measurements of Crustal Poisson's Ratio," *Nature* (in press).



# 1995

- Alcock, C., D. Alves, K. H. Cook, K. R. A. Allsman, T. S. Axelrod, K. C. Freeman, B. A. Peterson, P. J. Quinn, A. W. Rodgers, D. P. Bennett, K. Griest, J. Guern, M. J. Lehner, S. L. Marshall, M. R. Pratt, C. W. Stubbs, and W. Sutherland (1995), "First Observation of Parallax in a Gravitational Microlensing Event," *Astrophys. J. Lett.* **454**, L125.
- Alcock, C., R. A. Allsman, T. S. Axelrod, D. P. Bennett, K. H. Cook, K. C. Freeman, K. Griest, S. L. Marshall, B. A. Peterson, M. R. Pratt, P. J. Quinn, J. Reimann, A. W. Rodgers, C. W. Stubbs, W. Sutherland, and D. L. Welch (1995), "The MACHO Project LMC Variable Star Inventory: I. Beat Cepheids—Conclusive Evidence for the Excitation of the Second Overtone in Classical Cepheids," *Astrophys. J.* **109**, 1653.
- Alcock, C., R. A. Allsman, T. S. Axelrod, D. P. Bennett, K. H. Cook, K. C. Freeman, K. Griest, J. A. Guern, M. J. Lehner, S. L. Marshall, H.-S. Park, S. Perlmutter, B. A. Peterson, M. R. Pratt, B. J. Quinn, A. W. Rodgers, C. W. Stubbs, and W. Sutherland (1995), "Experimental Limits on the Dark Matter Halo of the Galaxy from Gravitational Microlensing," *Phys. Rev. Lett.* **74**, 2867.
- Alcock, C., R. A. Allsman, T. S. Axelrod, D. P. Bennett, K. H. Cook, K. C. Freeman, K. Griest, S. L. Marshall, S. Perlmutter, B. A. Peterson, M. R. Pratt, P. J. Quinn, A. W. Rodgers, C. W. Stubbs, and W. Sutherland (The MACHO Collaboration) (1995), "Probable Gravitational Microlensing towards the Galactic Bulge," *Astrophys. J.* **445**, 133.
- Alcock, C., R. A. Allsman, T. S. Axelrod, D. P. Bennett, K. H. Cook, N. W. Evans, K. C. Freeman, K. Griest, J. Jijina, M. Lehner, S. L. Marshall, S. Perlmutter, B. A. Peterson, P. J. Quinn, A. W. Rodgers, C. W. Stubbs, and W. Sutherland (1995), "Theory of Exploring the Dark Halo with Microlensing. I. Power-Law Models," *Astrophys. J.*, **449**, 28.
- Alley, R. B., R. C. Finkel, K. Nishiizumi, S. Anandkrishnan, C. A. Shuman, G. A. Zielinski, and P. A. Mayewski (1995), "Changes in Continental and Sea-Salt Atmospheric Loadings in Central Greenland during the Most Recent Deglaciation: Model-Based Estimates," *J. of Glaciology* **41**(139), 503–514.
- Alves, D. R., and K. H. Cook (1995), "Ground-Based Discovery of Cepheids and Miras in M101," *Astron. J.* **110**, 192.
- Armus, L., T. M. Heckman, K. A. Weaver, and M. D. Lehnert (1995), "Rosat Observations of NGC 2146: Evidence for a Starburst-Driven Superwind," *Astrophys. J.* **445**, 666.
- Becker, R. H., R. L. White, and D. J. Helfand (1995), "The FIRST Survey: Faint Images of the Radio Sky at Twenty Centimeters," *Astrophys. J.* **450**, 559.
- Bierman, P., A. Gillespie, M. W. Caffee, and D. Elmore (1995), "Estimating Erosion Rates and Exposure Ages with  $^{36}\text{Cl}$  Produced by Neutron Activation," *Geochim. et Cosmochim. Acta* **59**, 3779–3778.
- Bierman, P., A. Gillespie, and M. W. Caffee (1995), "Cosmogenic Age-Estimates for Earthquake Recurrence Intervals and Debris-Flow Fan Deposition, Owens Valley, California," *Science* **270**, 447–450.
- Bland-Hawthorn, J., R. D. Ekers, W. van Breugel, A. Koekemoer, and K. Taylor (1995), "Extragalactic Ionized Hydrogen in the Fornax Cluster," *Astrophys. J.* **447**, L-77.
- Brenan, J. M., H. F. Shaw, and F. J. Ryerson (1995), "Experimental Evidence for The Origin of Lead Enrichment in Convergent-Margin Magmas," *Nature* **378**, 54–56.
- Brenan, J. M., H. F. Shaw, F. J. Ryerson, and D. L. Phinney (1995), "Experimental Determination of Trace Element Partitioning between Pargasitic Amphibole and Hydrous Silicate Melt," *Earth and Planet. Sci. Letts.* **135**, 1–11.
- Brenan, J. M., H. F. Shaw, F. J. Ryerson, and D. L. Phinney (1995), "Mineral-Aqueous Fluid Partitioning of Trace Elements at 900°C and 2.0 GPa: Constraints on the Trace Element Chemistry of Mantle and Deep Crustal Fluids," *Geochim. et Cosmochim. Acta* **59**, 3331–3350.

## Appendix C

---

- Brenan, J. M. (1995), "Melts and Fluids: An Overview of Recent Advances," *Reviews of Geophys. Suppl.*, pp 33–40, U.S. National Report to the IUGG: Properties of the Solid Earth.
- Brenan, J. M., H. F. Shaw, and F. J. Ryerson (1995), "Trace Element Partitioning between Pargasite and Melt: Development of a Predictive Model using Elastic Strain Theory," Geological Society of America Annual Meeting, New Orleans.
- Brenan, J. M., H. F. Shaw, F. J. Ryerson, and D. L. Phinney (1995), "Ce/Pb Ratio of Fluid Produced by Basalt Dehydration: Constraints from Fluid/Mineral Partitioning Experiments" (invited), V. M. Goldschmidt Conference Programs and Abstracts, pg 33.
- Burton, K. W., M. J. Kohn, A. S. Cohen, and R. K. O'Nions (1995), "The Relative Diffusion and Isotopic Closure of Pb, Nd, Sr and O in Garnet," *Earth Planet. Sci. Lett.* **133**, 199–211.
- Constable, S., and A. Duba (1995), "Point-Defect Diffusion in Olivine-Rich Rock," *J. Geophys. Res.* (submitted).
- Cordie, P., and A. J. Gratz (1995), "TEM Study of Shock Metamorphism in Quartz from the Sedan Nuclear Test Site," *Earth and Planet. Sci. Lett.* **129**, 163.
- Dey, A., H. Spinrad, and M. Dickinson (1995), "Discovery of a  $z=2.76$  Dusty Radio Galaxy?," *Astrophys. J.* **440**, 515.
- Filippenko, A. V., A. J. Barth, T. Matheson, L. Armou, M. Brown, R. Espey, X. Fan, R. W. Goodrich, L. C. Ho, V. T. Junkkarinen, D. C. Koo, M. D. Lehnert, A. R. Martel, J. M. Mazzarella, J. S. Miller, G. H. Smith, D. Tytler, and G. D. Wirth (1995), "The 'Type Ic' Supernova 1994I in M51: Detection Helium and Spectral Evolution," *Astrophys. J. Lett.* **450**, L11.
- Finkel, R., and K. Nishiizumi (1995), "Cosmogenic Radionuclides in the GISP2 Ice Core, *Arctic Res. of the U.S.* **9**, 40–43.
- Gould, A. (1995), "Transverse Velocities of Galaxies from Microlens Parallaxes," *Astrophys. J.* **444**, 556.
- Graf, Th., M. W. Caffee, R. C. Finkel, K. Marti, K. Nishiizumi, and K. V. Ponganis (1995), "H-Chondrite Parent Break-Up Seven Million Years Ago: One or More Events?" (abstract), *Lunar and Planet. Sci.* **XXVI**, 487–488.
- Granger, D. E., J. W. Kirchner, and R. C. Finkel (1996), "Spatially Averaged Long-Term Erosion Rates Measured from *in-situ* Produced Cosmogenic Nuclides in Alluvial Sediment," *J. Geol.* **104**, 249–257.
- Gregg, M. D. (1995), "The Infrared Diameter Velocity Dispersion Relation for Elliptical Galaxies," *Astron. J.* **110**, 1052.
- Gurrola, H., G. E. Baker, and J. B. Minster (1995), "Simultaneous Time-Domain Deconvolution with Application to the Computation of Receiver Functions," *Geophys. J. Int.* **120**, 537.
- Harrison, T., P. H. Leloup, W. Chen, F. Ryerson, P. Tapponnier, and R. Lacassin (1995), "Diachronous Initiation of Transtension along the Ailao Shan-Red River Shear Zone, Yunnan and Vietnam," *The Tectonic of Asia*, A. Yin and T. Harrison, Eds., Cambridge Press (in press).
- Hawkins, G. W., C. J. Skinner, M. M. Meixner, J. G. Jernigan, and J. F. Arens (1995), "Discovery of an Extended Nebula Around AFGL 2343 (HD179821)," *Astrophys. J.* **452**, 314.
- Heckman, T. M., M. Dahlem, M. D. Lehnert, G. Fabbiano, D. Gilmore, and W. H. Waller (1995), "An X-Ray and Optical Study of the Dwarf Galaxy NGC 1569: Evidence For A Starburst-Driven Outflow," *Astrophys. J.* **448**, 98.
- Jedamzik, K. (1995), "The Cloud-In-Cloud Problem in the Press-Schechter Formalism of Hierarchical Structure Formation," *Astrophys. J.* **448**, 1.
- Jedamzik, K. and G. M. Fuller (1995), "Nucleosynthesis in the Presense of Primordial Isocurvature Baryon Fluctuations," *Astrophys. J.* **33**, 33.
- Jedamzik, K., G. J. Mathews, and G. M. Fuller (1995), "Absence of a Lower Limit  $\Omega_b$  in Inhomogenous Primordial Nucleosynthesis," *Astrophys. J.* **441**, 465.
-

- 
- Kohn, M. J., F. S. Spear, T. M. Harrison, and I. W. D. Dalziel (1995), " $^{40}\text{Ar}/^{39}\text{Ar}$  Geochronology and P–T–t Paths from the Cordillera Darwin Metamorphic Core Complex, Tierra del Fuego, Chile," *J. Metamorphic Geol.* **13**, 251–270.
- Koratkar, A., S. E. Deustua, T. Heckman, A. V. Filippenko, L. C. Ho, and M. Rao (1995), "Low-Luminosity Active Galaxies: Are They Similar to Seyfert Galaxies?," *Astrophys. J.* **440**, 132.
- Lee, S., D. N. Schramm, and G. J. Mathews (1995), "A Merger Model and Globular Cluster Formation," *Astrophys. J.* **449**, 616.
- Lehnert, M. D., and T. M. Heckerman (1995), "Ionized Gas in the Halos of Edge-On, Starburst Galaxies: Data and Results," *Astrophys. J. Suppl.* **439**, 588.
- Lehnert, M. D., and T. M. Heckman (1995), "Ionized Gas in the Halos of Edge-On, Starburst Galaxies: Data and Results," *Astrophys. J.* **97**, 89.
- Lowenthal, J. D., T. M. Heckman, M. D. Lehnert, and J. H. Elias (1995), "Imaging the Host Galaxies of High-Redshift Radio-Quiet QSOs," *Astrophys. J.* **439**, 588.
- McCarthy, P. J., H. Spinard, and W. van Breugel (1995), "Emission Line Imaging of 3CR Radio Galaxies. I: The Imaging Data," *Astrophys. J.* **99**, 27.
- McNamara, D. E. (1995), *Lithospheric Structure of the Tibetan Plateau*, Ph.D. Dissertation, University of South Carolina.
- McNamara, D. E., and T. J. Owens (1995), "Regional Phase Propagation within the Tibetan Plateau," *7th Annual IRIS Workshop*, 21–24 June, Jackson, WY.
- McNamara, D. E., T. J. Owens, and W. R. Walter (1995), "Observations of Regional Phase Propagation across the Tibetan Plateau," *J. Geophys. Res.* **100**, 22,215–22,229.
- McNamara, D. E., and W. R. Walter (1995), *Lithospheric Structure of the Tibetan Plateau from Relocation of Local and Regional Earthquakes*, Lawrence Livermore National Laboratory, Livermore, CA.
- McNamara, D. E., and W. R. Walter (1995), "Regional Waveform Modeling and Phase Propagation in Northern Africa," *EOS Trans. AGU* **76**, 199.
- Minarik W. G., and E. B. Watson (1995), "Interconnectivity of Carbonate Melt at Low Melt Fraction," *Earth and Planet. Sci. Letts.* **133**, 423–437.
- Nimz, G. J., K. L. Cameron, and S. Niemeyer (1995), "Formation of Mantle Lithosphere beneath Northern Mexico: Chemical and Sr–Nd–Pb Isotopic Systematics of Peridotite Xenoliths from La Olivina," *J. Geophys. Res.* **100**, 4181.
- Nishiizumi, K., J. R. Arnold, D. E. Brownlee, M. W. Caffee, R. C. Finkel, and R. P. Harvey (1995), " $^{10}\text{Be}$  and  $^{26}\text{Al}$  in Individual Cosmic Spherules from Antarctica," *Meteoritics* **30**, 728–732.
- Nishiizumi, K., M. W. Caffee, R. C. Finkel, and R. C. Reedy (1995), "Exposure History of Lunar Meteorite QUE93069" (abstract), *Lunar and Planet. Sci.* **XXVI**, 1051–1052.
- Nishiizumi, K., R. C. Finkel, M. W. Caffee, and R. C. Reedy (1995), "Solar Cosmic Ray Records in Meteorites" (abstract), *Lunar and Planet. Sci.* **XXVI**, 1053–1054.
- Nishiizumi, K., C. P. Kohl, J. R. Arnold, R. C. Finkel, M. W. Caffee, J. Masarik, and R. C. Reedy (1995), "Solar Cosmic Ray Records in Meteorites" (abstract), *Lunar and Planet. Sci.* **XXVI**, 1053–1054.
- Reid, I. N., S. L. Hawley, and J. E. Gizis (1995), "The Palomar/MSU Nearby-Star Spectroscopic Survey. I. The Northern M. Dwarf—Bandstrengths and Kinematics," *Astron. J.* **110**, 1838.
- Robert, J., and A. Duba (1995), "Transient Electrical Response of San Quintin Dunite as a Function of Oxygen Fugacity Change: Information about Charge Carrier," *Geophys. Res. Lett.* **22**, 453.
-

## Appendix C

---

- Ryutova, M. P., and S. R. Habbal (1995), "The Effects of Mass Flows on the Dissipation of Alfvén Waves in the Upper Layers of the Solar Atmosphere," *Astrophys. J.* **451**, 381.
- Shepard, M. K., R. E. Arvidson, M. W. Caffee, R. C. Finkel, and L. Harris (1995), "Cosmogenic Exposure Ages of Basalt Flows: Lunar Crater Volcanic Field, Nevada," *Geology* **23**, 21–25.
- Sigl, G., K. Jedamzik, D. N. Schramm, and V. S. Berezinsky (1995), "Helium Photodisintegration and Nucleosynthesis: Implications for Topological Defects, High Energy Cosmic Rays and Massive Black Hole," *Phys. Rev. D* **448**, 31.
- Skinner, C. J., R. J. Sylvester, J. R. Graham, M. J. Barlow, M. Meixner, E. Keto, J. F. Arens, and J. G. Jernigans (1995), "The Dust Disk Around the Vegas-Excess Star SAP26804," *Astrophys. J.* **448**, 831.
- Spear, F. S., M. J. Kohn, and S. Paetzold (1995), "The Regional Sillimanite Zone, West-Central New Hampshire, U. S. A.," *Am. Mineral.* **80**, 361–376.
- Valley, J. W., N. Kitchen, M. J. Kohn, C. R. Niendorf, and M. J. Spicuzza (1995), "UWG-2, a Farnet Standard for Oxygen Isotope Ratios: Strategies for High Precision and Accuracy with Laser Heating," *Geochim. Cosmochim. Acta* **59**, 5223–5231.
- Vogel, J. S., K. W. Turteltaub, R. Finkel, and D. E. Nelson (1995), "Accelerator Mass Spectrometry: Isotope Identification at Attomole Sensitivity," *Anal. Chem. A* **67**, 353A–359A.
- White, R. L., and R. B. Becker (1995), "An 8 Year Study of the Radio Emission from the Wolf-Rayet Binary HD 193793 = WR 140," *Astrophys. J.* **451**, 352.
- Zandt, G., and C. J. Ammon (1995), "Continental Crust Composition Constrained by Measurements of Crustal Posson's Radio," *NTR* **374**, 152.

---

## **Appendix D**

**IGPP-LLNL  
Organization Chart**

---



# Institute of Geophysics and Planetary Physics (IGPP) Lawrence Livermore National Laboratory (LLNL)

